
Acoustic Report Review

**Bathurst Harness Racing
Bathurst**

Project 213 008

March 2013

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The work reported herein has been carried out in accordance with the terms of membership. We stress that the advice given herein is for acoustic purposes only, and that the relevant authorities should be consulted with regard to compliance with regulations governing areas other than acoustics.

1 INTRODUCTION, SCOPE AND LIMITATIONS

The purpose of this report is to provide a review of an acoustic report that was prepared relating to an application for a new harness racing track and associated. It is proposed to relocate the Bathurst Harness Racing Club from Bathurst Showgrounds to the new facility to land bounded by Ethelton Avenue and College Road in Bathurst. This review is in accordance with a request from Bathurst Regional Council dated 24 January 2013.

The review addresses the report prepared by Wilkinson Murray Pty Ltd titled *Bathurst Harness Racing Track Relocation* dated July 2012, report number 12088 Version A (hereafter referred to as the Wilkinson Murray report). A copy of the report is appended as Attachment C. The author of the report is Luke Warren.

The scope of this review is to:

1. Identify any areas of deficiency in the Wilkinson Murray report or areas requiring further clarification.
2. Compare data and predictions within the Wilkinson Murray report to those measured calculated by PKA.
3. Determine whether the Wilkinson Murray report provides sufficient basis for its conclusions.

This report is based on the following data and documentation:

- The Wilkinson Murray report
- An inspection of the proposed site for the new track and surrounding area on 13 February 2013
- An inspection of the existing track at Bathurst Showgrounds and measurements of a Harness Racing meeting on 13 February 2013
- Noise data logging near the proposed site for the new track from 13/2/13 to 25/2/13
- Statement of Environmental Effects prepared by Geolyse dated September 2012, reference 211291_REO_001 (Final)

The following calculation standards have been used where noted:

- ISO 9613-2:1996. This International Standard specifies an engineering method for calculating the attenuation of sound during propagation outdoors. This standard is widely used by acousticians within Australia and is often implemented during computer modelling of sound propagation.

2 SUMMARY

Our review of the Wilkinson Murray report has found number of instances where insufficient data has been provided for assessment.

Measurements carried out by PKA also indicate that ambient noise levels at the proposed site are lower than those used as the basis for the Wilkinson Murray report. PKA measurements of existing harness racing operations at Bathurst Showground found significantly higher noise levels from the public address system than those used as the basis for the Wilkinson Murray report.

As such we do not consider that the Wilkinson Murray report demonstrates that the facility will comply with the required noise criteria.

3 EXISTING AMBIENT NOISE LEVELS

3.1 Wilkinson Murray Results

Section 3 of the Wilkinson Murray report sets out the results of noise monitoring conducted between 12 and 18 March 2012 on the western boundary of the property at 23 Ethelton Avenue, the nearest potentially affected residential receiver. The summary results of the Wilkinson Murray noise logging are reproduced below.

Time period	$L_{Aeq(period)}$ dB(A)	RBL dB(A)
Day	49	38
Evening	52	45
Night	48	38

Table 3.1: Wilkinson Murray ambient noise logging summary

The Rating Background Level (RBL) and $L_{Aeq(period)}$ are as defined by the EPA Industrial Noise Policy (INP).

3.2 PKA Measurements

Bathurst Regional Council expressed concern regarding the ambient noise levels in the Wilkinson Murray report. As such PKA were instructed to undertake additional ambient noise monitoring.

PKA deployed two noise loggers at residences surrounding the site between Wednesday 13 February and Monday 25 February. The loggers are of ARL manufacture Type EL-316 and were calibrated prior to and following measurements with a Bruel & Kjaer sound level calibrator Type 4230. Drift was less than 0.5dB(A) and therefore was within tolerance. The loggers sampled in 15 minute periods, using an A-weighting curve before converting the information to statistical quantities and commencing a new period.

Logger A was installed in the south western corner of the property at 23 Ethelton Avenue. This was on the same boundary on which the Wilkinson Murray logger was installed.

Logger B was installed in the front yard of 182 College Road, set back approximately 15m from the edge of College Road.

The results from the loggers are summarised below. Data from Sunday 24 February was excluded from the averaging due to rain. Detailed graphical results are shown in Attachments A and B.

Noise descriptor	Logger A – 23 Ethelton Ave	Logger B – 182 College Rd
RBL Day	32	31
RBL Evening	31	36
RBL Night	27	31
Leq Day	50	56
Leq Evening	47	54
Leq Night	46	49

Table 3.2: PKA noise logger results – Industrial Noise Policy descriptors – dB(A)

I note that at the College Road location the Evening RBL is higher than the Daytime RBL. I do not have any additional data that explains these results. It may be due to insect activity near this location during the Evening period or due to noise from residents being home during the Evening more than during the Daytime.

3.3 Discussion of ambient noise levels

The table below shows a comparison of the ambient levels measured at 23 Ethelton Avenue by PKA and Wilkinson Murray.

Noise descriptor	Wilkinson Murray results – 23 Ethelton Ave	PKA results – 23 Ethelton Ave
RBL Day	38	32
RBL Evening	45	31
RBL Night	38	27
Leq Day	49	50
Leq Evening	52	47
Leq Night	48	46

Table 3.3: Noise logger results at 23 Ethelton Ave – PKA vs Wilkinson Murray – dB(A)

The Leq results, particularly during the Day and Night periods, correlate closely.

The background RBL results measured by PKA however are significantly lower than those measured by Wilkinson Murray. We measured levels 6dB(A) lower during the Day period, 14dB(A) lower during the Evening period and 11dB(A) lower during the Night period.

I do not have sufficient data to establish why the levels measured by Wilkinson Murray would be higher than those measured by PKA.

I am satisfied that the PKA measured levels accurately reflect the ambient noise environment in the area during our survey period.

4 OPERATIONAL NOISE CRITERIA

4.1 Scope of noise assessed

The Wilkinson Murray report identified the following operational noise sources for assessment:

- Public address system
- Harness racing activities
- Movement of vehicles into, out of, and within the complex

We note that the following additional noise sources have not been assessed by the Wilkinson Murray report:

- Noise from spectators
- Proposed use of the central reservation of the harness track as sports fields (as noted in Section 3.1 of the Statement of Environmental Effects)

Further assessment of noise from these sources is outside the scope of the PKA review but a review of these noise sources should be completed by a qualified acoustic consultant prior to consent for these activities being granted.

4.2 Noise policy used

The Wilkinson Murray report correctly notes that the EPA Noise Guide for Local Government (NGLG) identifies Council as the responsible authority for the subject sporting facility. The NGLG encourages local councils “to develop noise policies which specify intrusive noise levels and appropriate descriptors for particular activities in certain situations and locations.” An example is given of a background + 5 dB(A) criterion.

To my knowledge Council does not have a specific noise policy covering noise from sporting facilities. In the absence of such a policy I consider that Wilkinson Murrays adoption of a background + 5dB(A) criteria is reasonable.

It could however also be argued that adoption of the EPA Industrial Noise Policy (INP) would be appropriate given the scale, complexity and commercial nature of the development. Use of the INP also provides for some protection of the Amenity noise levels in the area.

I note that Section 5 of the Bathurst Regional (Interim) Development Control Plan 2011 requires ‘business or industrial development’ to be assessed in accordance with the Industrial Noise Policy. Whilst this section of the DCP does not directly address sporting venues (such as the proposed harness racing facility) it does indicate that Council assesses other significant commercial developments against the INP.

It is my opinion that use of the INP would provide a more detailed assessment of the site and would ideally be used for any future assessments. However I note that this would be at Councils discretion.

I have retained the use of the Wilkinson Murray Intrusiveness criteria for the purposes of this review.

The Intrusiveness criteria is suitable to assess noise from activities occurring on site, including vehicle movements on the site. However it would not be an appropriate criteria for the assessment of the noise impact on existing residences due to additional traffic associated with the development on local roads. This

should be assessed against the EPA/OEH NSW Road Noise Policy. This policy gives assessment criteria of $Leq_{(1hr)}$ Day (7am-10pm) of 55dB(A) and $Leq_{(1hr)}$ Night (10pm-7am) of 50dB(A). These are external noise levels to be assessed in front of a residential building facade.

Section 5 of the Wilkinson Murray report indicates the facility will operate at intermittent intervals between 7am and 10pm. Attendance at a race meeting at the existing track on 13/2/13 found the final race scheduled for 9:43pm. Whilst the racing itself may be finished by 10pm there would still be activity on site (car movements etc) after 10pm if the current usage patterns continued at the new facility. As such the potential for sleep arousal during the Nighttime period (after 10pm) may need to be considered.

The Wilkinson Murray report does not provide any criteria relating to potential sleep arousal as it assumes no use of the site will occur after 10pm.

If activity will occur after 10pm the potential for sleep arousal will need to be assessed. Section 2.2.4 of the NGLG notes that:

Currently, there is no definitive guideline to indicate a noise level that causes sleep disturbance and more research is needed to better define this relationship. Where likely disturbance to sleep is being assessed, a screening test can be applied that indicates the potential for this to occur. For example, this could be where the subject noise exceeds the background noise level by more than 15dB(A). The most appropriate descriptors for a source relating to sleep disturbance would be $L_{A1}(1\text{minute})$ (the level exceeded for 1% of the specified time period of 1 minute) or L_{Amax} (the maximum level during the specified time period) with measurement outside the bedroom window.

In the absence of a specific direction from Council we would adopt the above criteria for the assessment of sleep arousal at the site.

4.3 Site specific noise criteria

Based on the policy discussion in Section 4.2 and the measured noise levels on site discussed in Section 3 site specific noise criteria have been calculated.

Intrusive noise from activities on site would be governed by the Intrusiveness criteria below.

Period	23 Ethelton Ave	182 College Rd
Day	37	36
Evening	36	36**
Night	35*	36

Table 4.1: Site specific Intrusiveness criteria – $Leq(15\text{min})$ dB(A)

* Based on EPA minimum design background level of 30dB(A)

** The Evening criteria has been based on the lower Daytime ambient levels in accordance with the Application Notes to the INP

I note that the above criteria are significantly lower than those presented in Table 4-1 of the Wilkinson Murray report. This is due to the lower ambient noise levels recorded by PKA on site, as discussed in Section 3.

In the event of any activity occurring on site after 10pm sleep arousal would be governed by the criteria set out in Table 4.2 below.

23 Ethelton Ave	182 College Rd
45*	46

Table 4.2: Site specific sleep arousal criteria – $L_{1(60\text{sec})}$ dB(A)

* Based on EPA minimum design background level of 30dB(A)

Noise from additional vehicle movements would be assessed against the criteria in Table 4.3 below.

Period	Assessment criteria (external) $L_{Aeq(1hr)}$ dB(A)
Day (7am-10pm)	55
Night (10pm-7am)	50

Table 4.3: Criteria for additional traffic on local roads – $L_{Aeq(1hr)}$ dB(A)

5 NOISE MODELLING AND PREDICTIONS

5.1 Noise from vehicles

Section 3.1 of the Statement of Environmental Effects indicates on-site parking for 241 cars and 43 trucks. Given the rural setting of the site car and truck movements, could generate significant noise levels, particularly if they are tightly grouped (for example at the end of the nights racing).

The Wilkinson Murray report identifies that noise from vehicle movements on site and accessing the site is assessed. Section 5 of the report notes that “intermittent noise may also be generated by vehicles accessing the facility; however, this is not considered to be an issue”. The report gives no further discussion to vehicle noise nor any quantitative data to support the assertion that such noise will not be an issue.

Detailed analysis of noise levels generated by vehicle movements would be required for Council to be confident that noise levels from such sources comply with the site specific criteria.

5.2 Measured source noise levels of harness racing

Page 2 of the Wilkinson Murray report notes that the assessment included “measurement of noise levels typical of a race meeting at the existing Bathurst Harness racing track”. It is unclear to me whether this included measurements at the existing track at Bathurst Showgrounds or measurements at another track which was deemed to have noise levels “typical of a race meeting at the existing Bathurst Harness racing track”.

The measured source noise levels are presented in Table 5-1 of the Wilkinson Murray report and are reproduced below.

Item	Leq _(15min) - dB(A)
Public address at 25m	52
Harness racing at 30m	58

Table 5.1: Wilkinson Murray measured source noise levels

In order to establish noise levels at the existing Bathurst Harness Racing track measurements were carried out at Bathurst Showgrounds during a night race meeting on Wednesday 13 February 2013. Measurements were carried out between 6:00pm and 9:20pm. Measurements were carried out with a Svantek type 949 Sound Level Analyser, calibrated prior to, at intervals during, and following the measurements with a Bruel & Kjaer type 4230 Sound Level Calibrator and exhibited no significant drift.

Noise from the public address system dominated the acoustic environment at points close to the track (within 40m of the edge of the track). Speakers were located approximately every 25m, just inside the track. There were no points around the perimeter of the track where measurements could be taken without significant influence from the sound levels of the public address system.

The Leq measured over the race duration (2:45 to 3:40) was 67-68dB(A) at a position 30m from the nearest speakers. The instantaneous sound pressure levels from the announcements reached 78dB(A) at this location, with the loudest levels as the horses entered the final 100m of the race. This position was 10m from the edge of the track. As the group of horses passed each lap the sound pressure levels increased up to 74dB(A) for approximately 5 seconds.

At a position 20m from the track edge (40m from the nearest speaker) the horses passing by each lap gave rise to noise levels up to 70dB(A). The Leq measured over the race duration (4:06) was 64.8dB(A) and was dominated by sound levels from the public address system.

At a position 40m from the track edge (60m from the nearest speaker) the horses passing by each lap gave rise to noise levels up to 65dB(A). The Leq measured over the race duration (3:26) was 63.7dB(A) and was dominated by sound levels from the public address system.

From our measurements we have calculated a pass-by level of the horses of 67dB(A) at 30m. For comparison to the Wilkinson Murray levels we have calculated an $Leq_{(15min)}$ contribution at 30m based on this pass-by level, a 1000m track and horses circling the track constantly. The $Leq_{(15min)}$ contribution from the horses is 55dB(A).

A comparison of the Wilkinson Murray and PKA measured source noise levels is shown below.

Item	Wilkinson Murray	PKA
Public address at 25m	52	68
Harness racing (excl. PA) at 30m	58	55

Table 5.2: Comparison of measured source noise levels $Leq_{(15min)}$ - dB(A)

The Leq noise levels due to the harness racing measured by both Wilkinson Murray and PKA are within 3dB(A) of one another.

We note that the PKA measurements were not able to directly measure the Leq of the horses due to the dominant influence of the public address system. We have no reason to doubt the accuracy of Wilkinson Murrays measurements of 58dB(A) Leq of noise from the horse racing.

The noise levels measured by PKA and Wilkinson Murray of the public address system however are not in agreement, with PKA measuring Leq levels 16dB(A) higher than those identified by Wilkinson Murray. The levels presented by Wilkinson Murray do not appear to accurately represent the levels from the PA system at the Bathurst Showgrounds, as experienced during my site visit.

5.3 Predicted noise levels at receivers

Section 6 of the Wilkinson Murray report indicates that noise modelling was completed for all residential receiver locations. We note however that detailed modelling results (contour maps etc) are not provided.

Noise modelling of the site is the most appropriate way to calculate noise levels to the surrounding residential receivers and will account for attenuation due to topography etc. Construction of a noise model is beyond the scope of this review. We have however carried out some basic calculations, taking into account distance attenuation, atmospheric absorption and ground effect (Agr as defined in ISO 9613-2). Our calculations do not however include shielding from existing topography.

Table 6-1 of the Wilkinson Murray report provides predicted noise levels at the six nearest residential receivers.

Wilkinson Murray have calculated that the expected noise levels at 43 Ethelton Avenue due to racing activities (horses and PA) will be 47dB(A) Leq.

The boundary of 23 Ethelton appears to be approximately 40m from the nearest edge of the proposed track. Wilkinson Murrays own measurement data indicated Leq noise levels of 58dB(A) at 30m from harness racing. The additional distance attenuation from 30m to 40m would be no more than 2.5dB. This would give rise to noise levels of around 55dB(A) at 40m based on Wilkinson Murrays own data.

Noise levels measured by PKA at the existing facility gave rise to a measured Leq noise level of 64dB(A) at 40m from the edge of the track.

It is difficult to understand how the result of 47dB(A) has been calculated.

If spectators were allowed in the area between the track at the residential boundary noise levels could increase further. Similarly if the PA system were located on the outside of the track the noise levels could increase.

It is beyond the scope of this report to calculate noise levels to all residential receivers, particularly as we cannot accurately calculate the shielding from natural topography which may result in significant shielding at such receivers.

Our estimates to the remaining nominated properties in College Road and Gormans Hill Road indicate noise levels in the order of 35-38dB(A). Allowing for some additional shielding from natural topography the results at these locations may conceivably be in the order of 33-34dB(A) predicted by Wilkinson Murray.

Additional data would be required to substantiate the calculated outcomes.

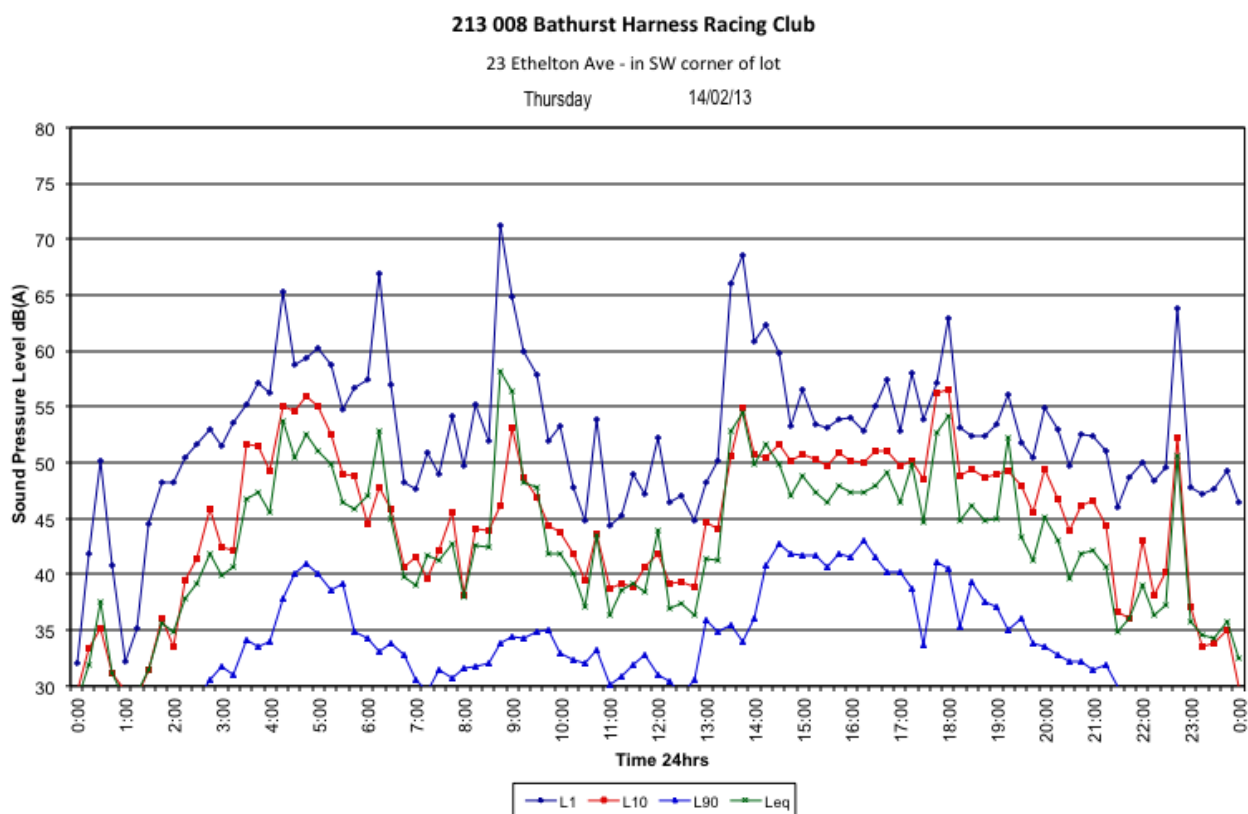
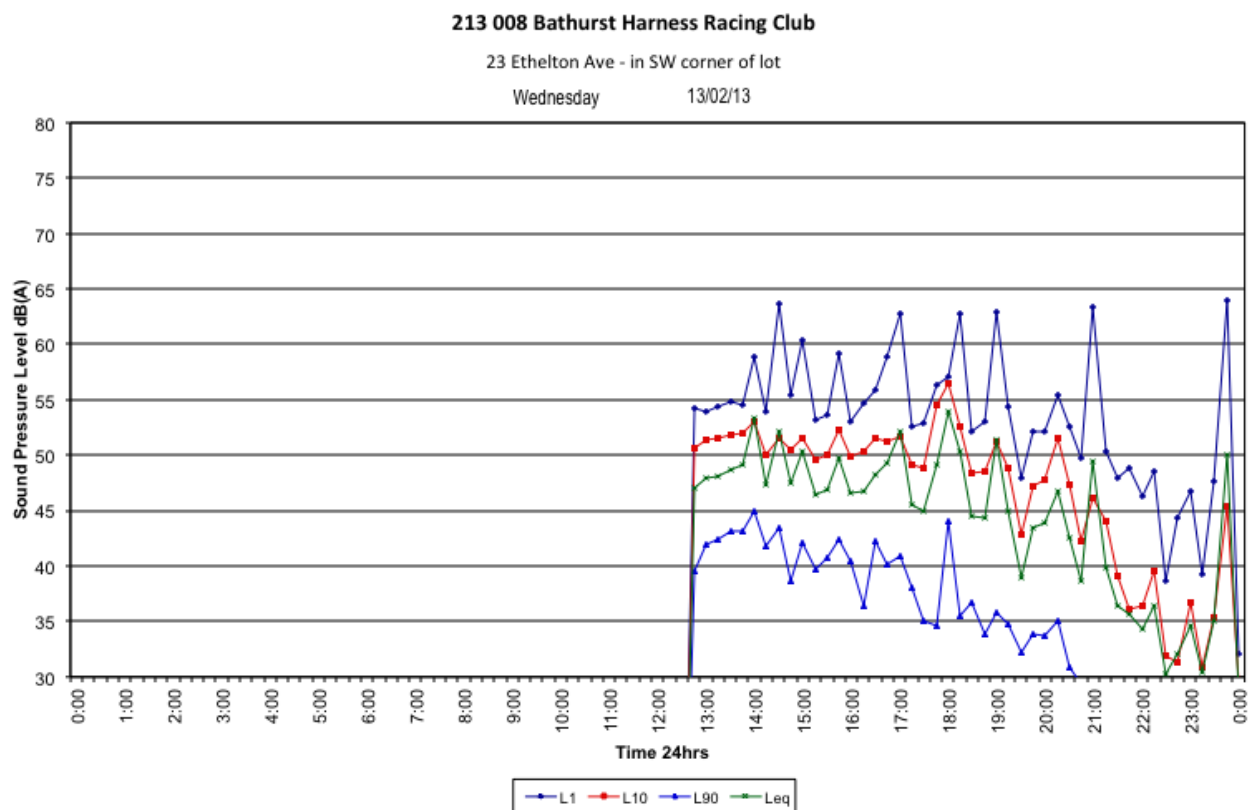
6 COMMENT ON WILKINSON MURRAY RECOMMENDATIONS

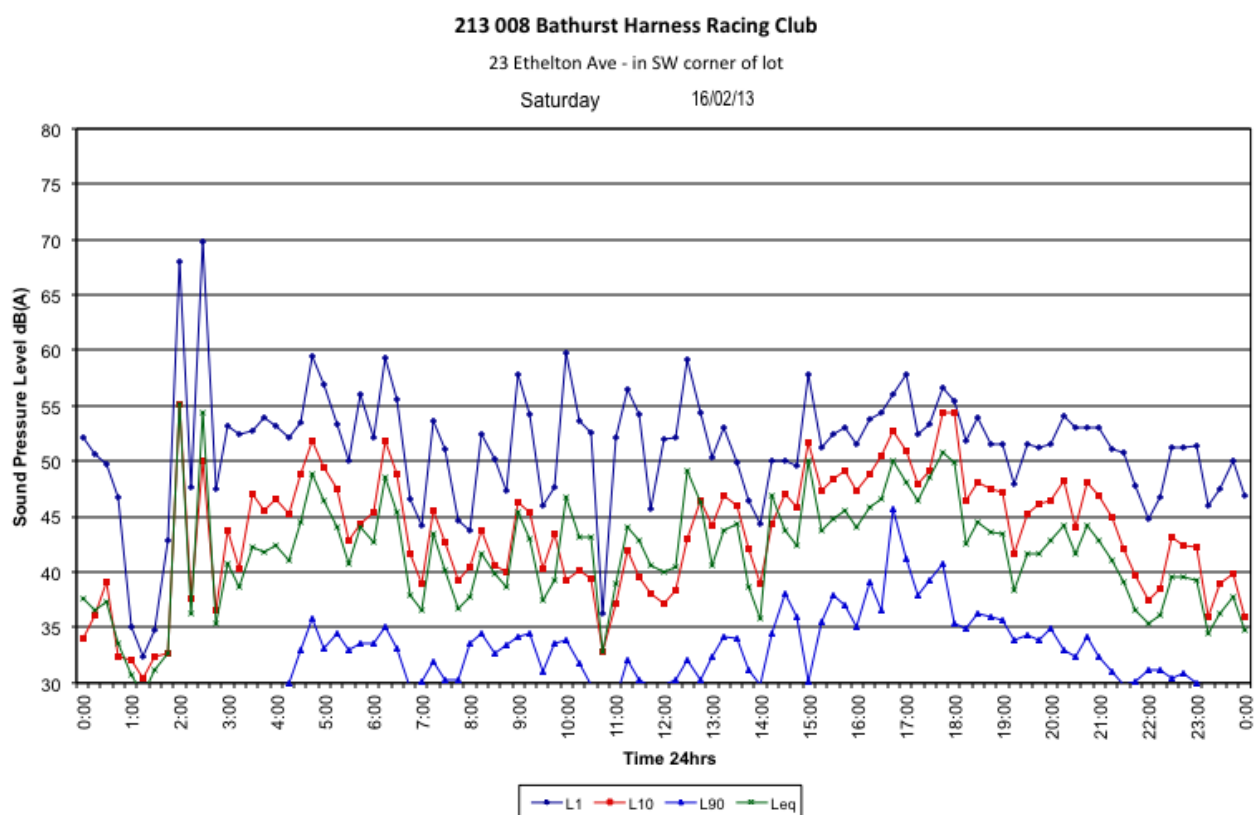
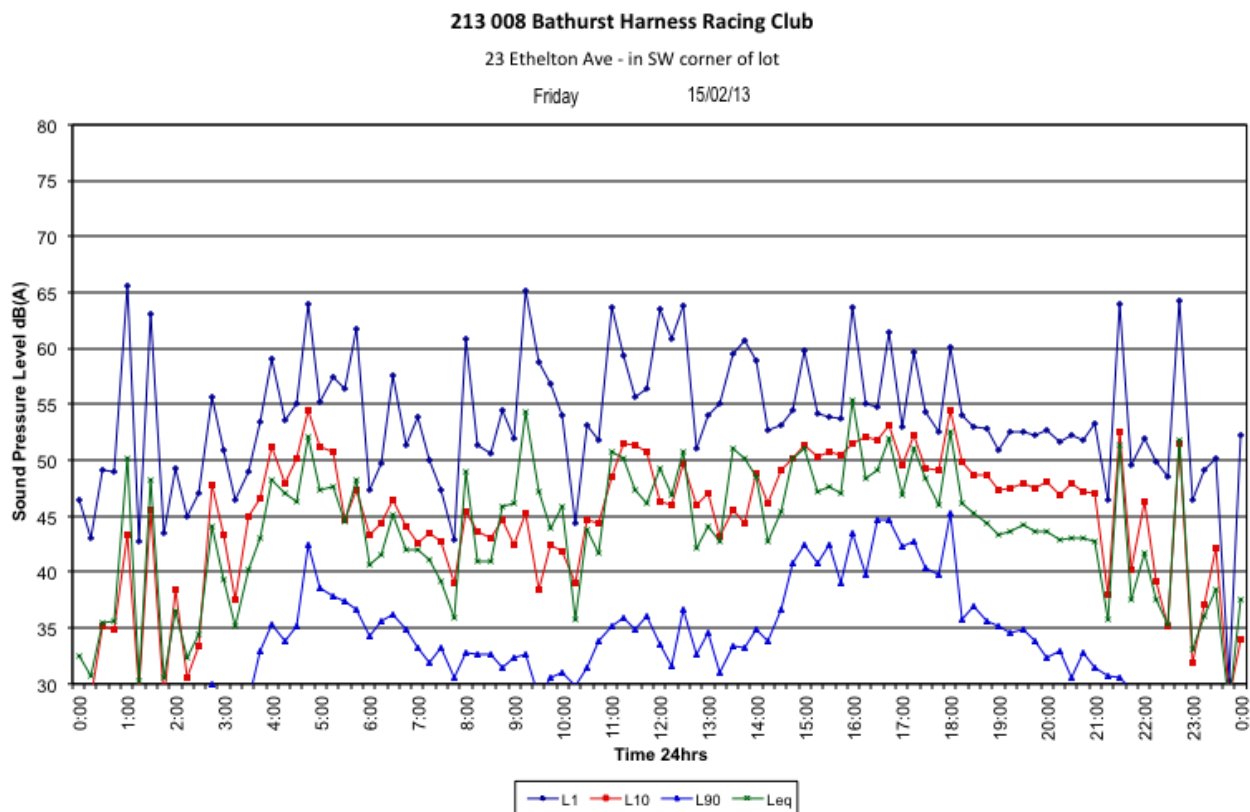
The required noise reduction calculated by Wilkinson Murray is 4dB(A). Section 7 of the report provides details of the barrier or dirt bund to provide the required 4dB(A) reduction.

As noted in previous sections the Wilkinson Murray report appears to significantly overestimate the allowable noise goals whilst underestimating the noise levels generated from the track.

This means that the noise reduction required will exceed the 4dB(A) nominated by Wilkinson Murray. Accordingly the proposed barrier is unlikely to provide the required noise reduction.

7 ATTACHMENT A: PKA NOISE LOGGING RESULTS - 23 ETHELTON AVE



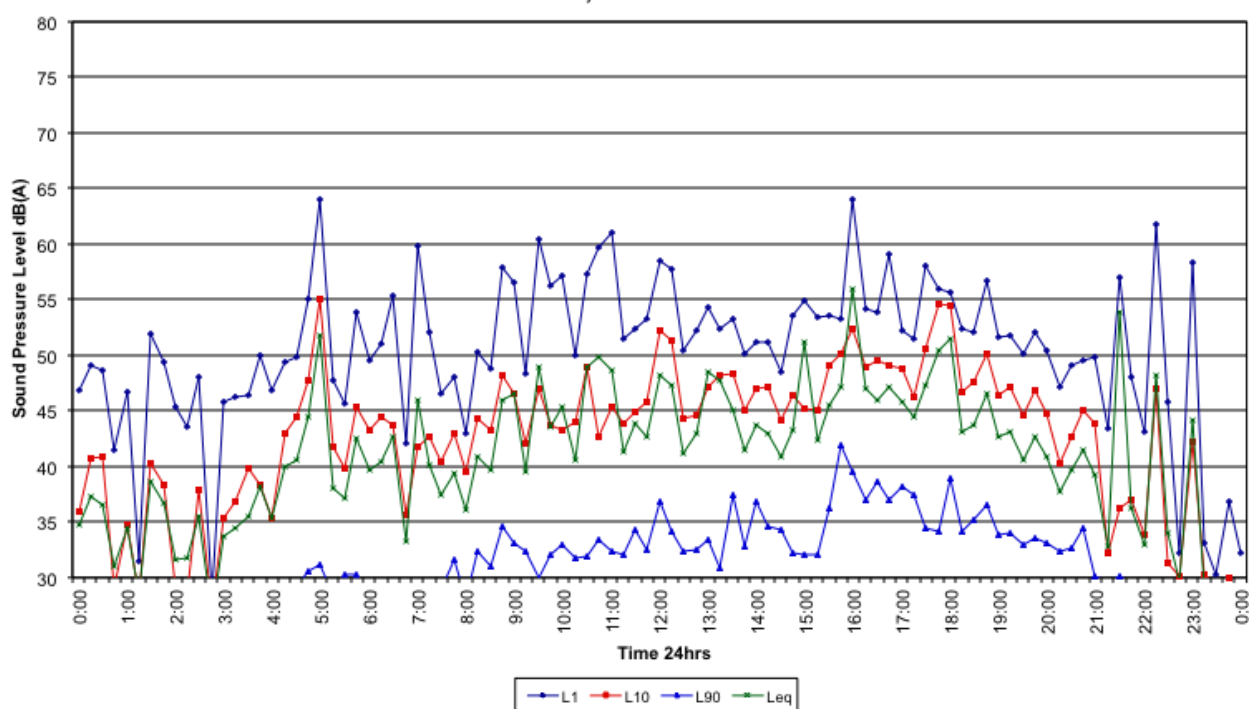


213 008 Bathurst Harness Racing Club

23 Ethelton Ave - in SW corner of lot

Sunday

17/02/13

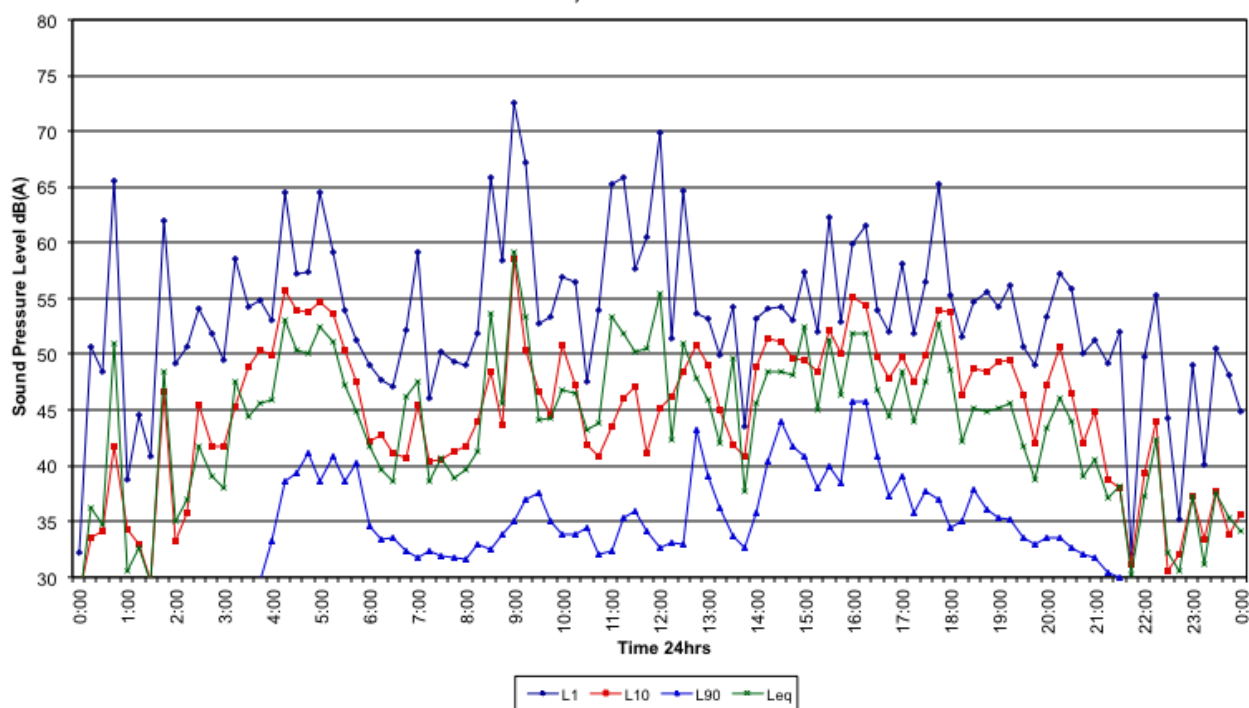


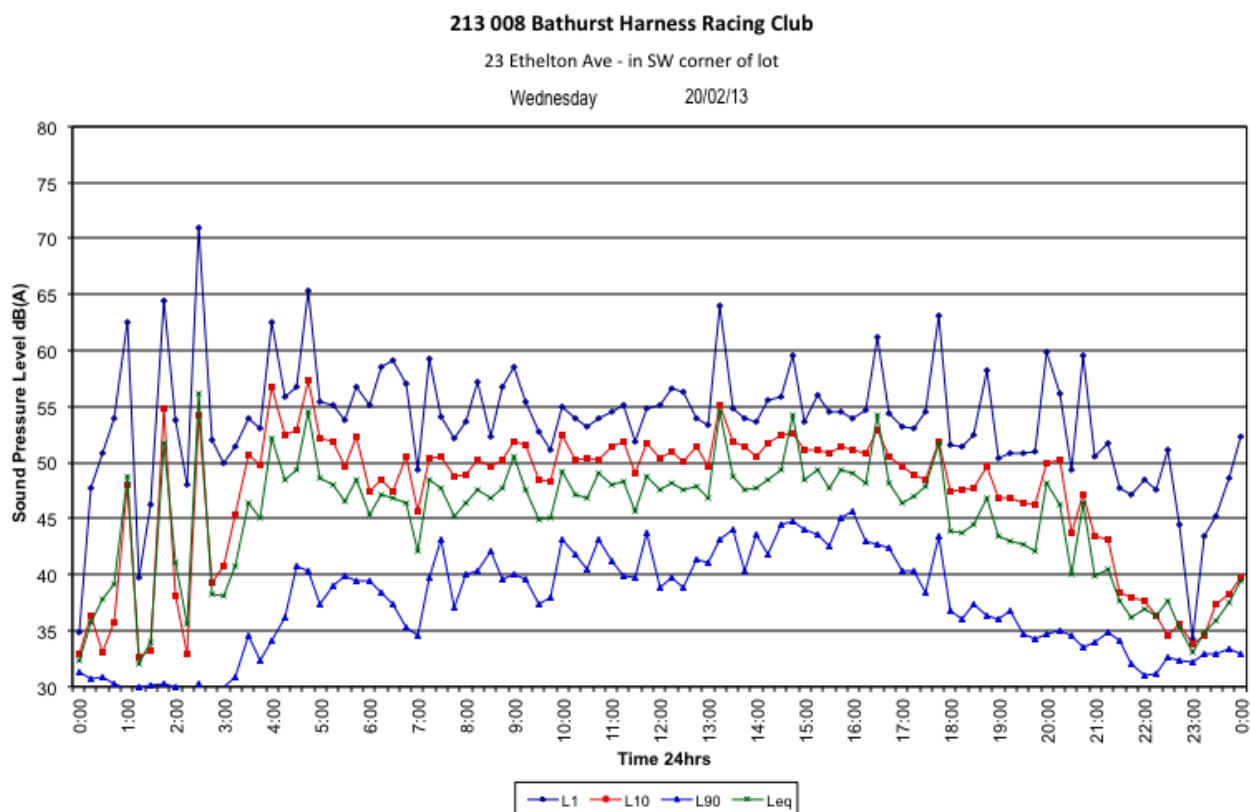
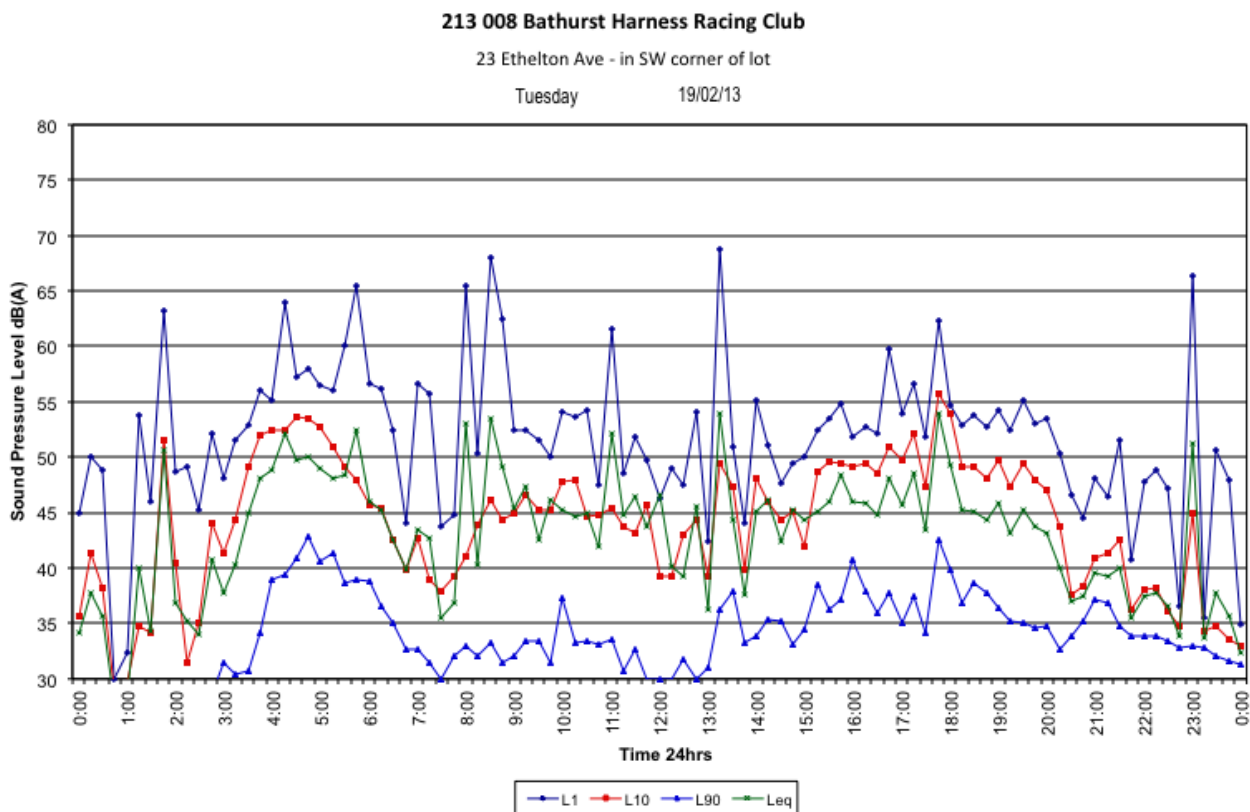
213 008 Bathurst Harness Racing Club

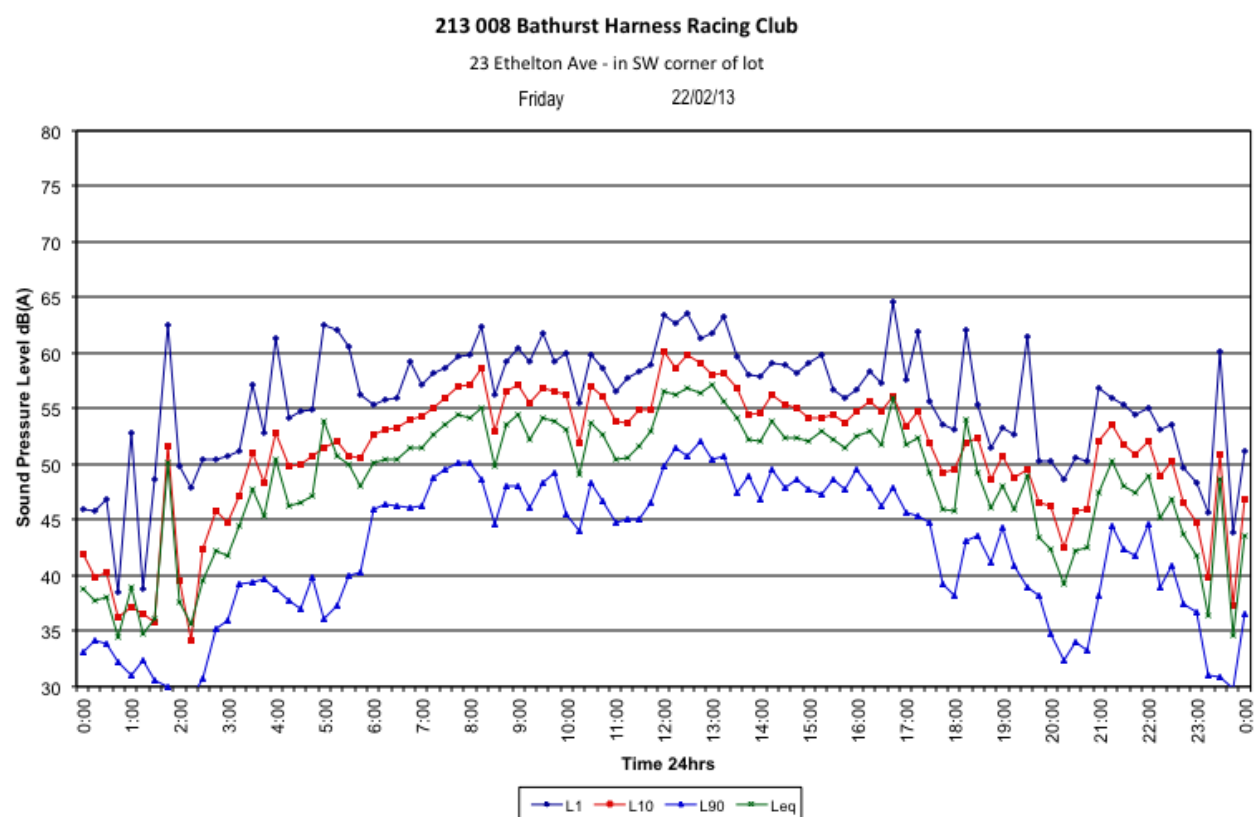
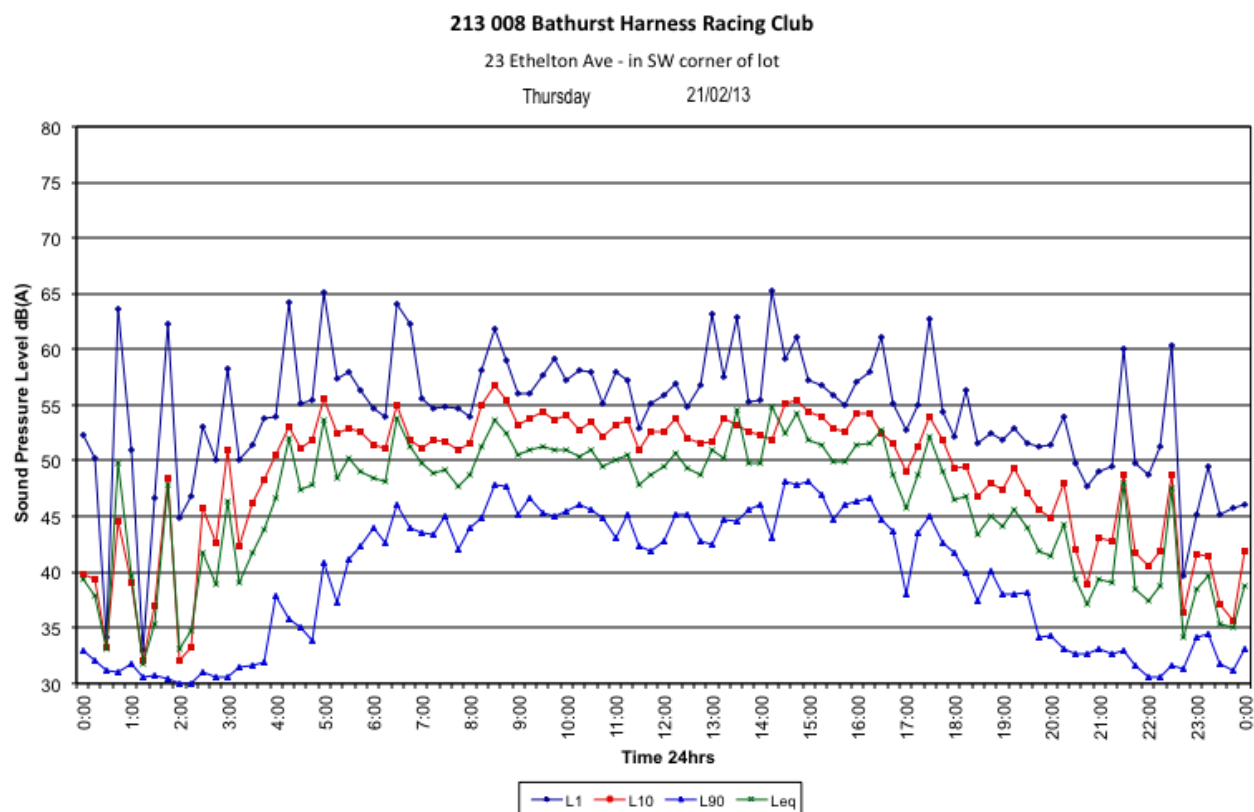
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Monday

18/02/13



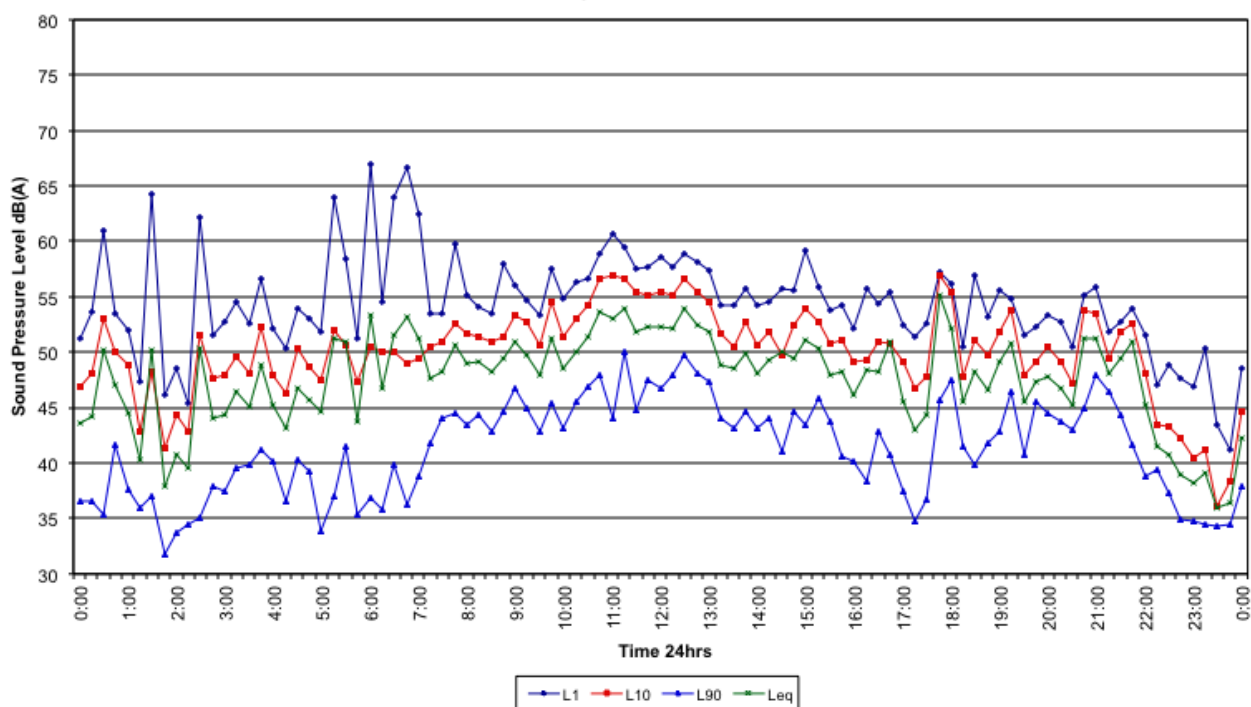




213 008 Bathurst Harness Racing Club

23 Ethelton Ave - in SW corner of lot

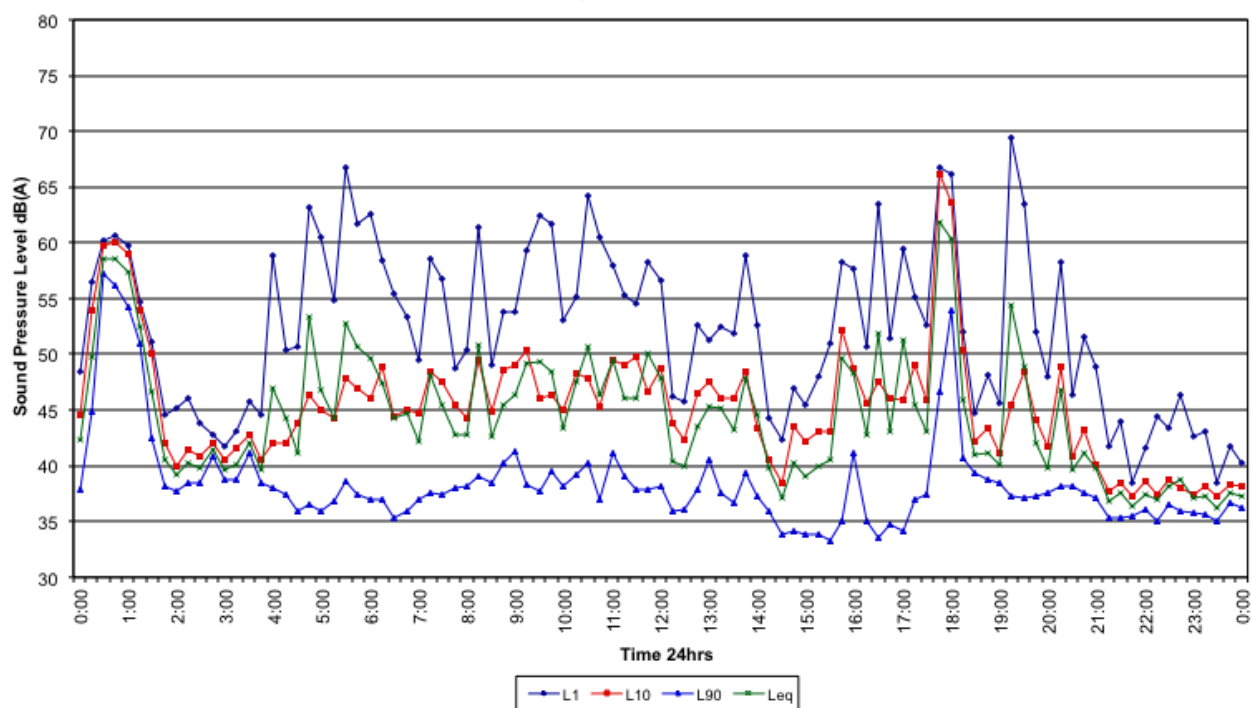
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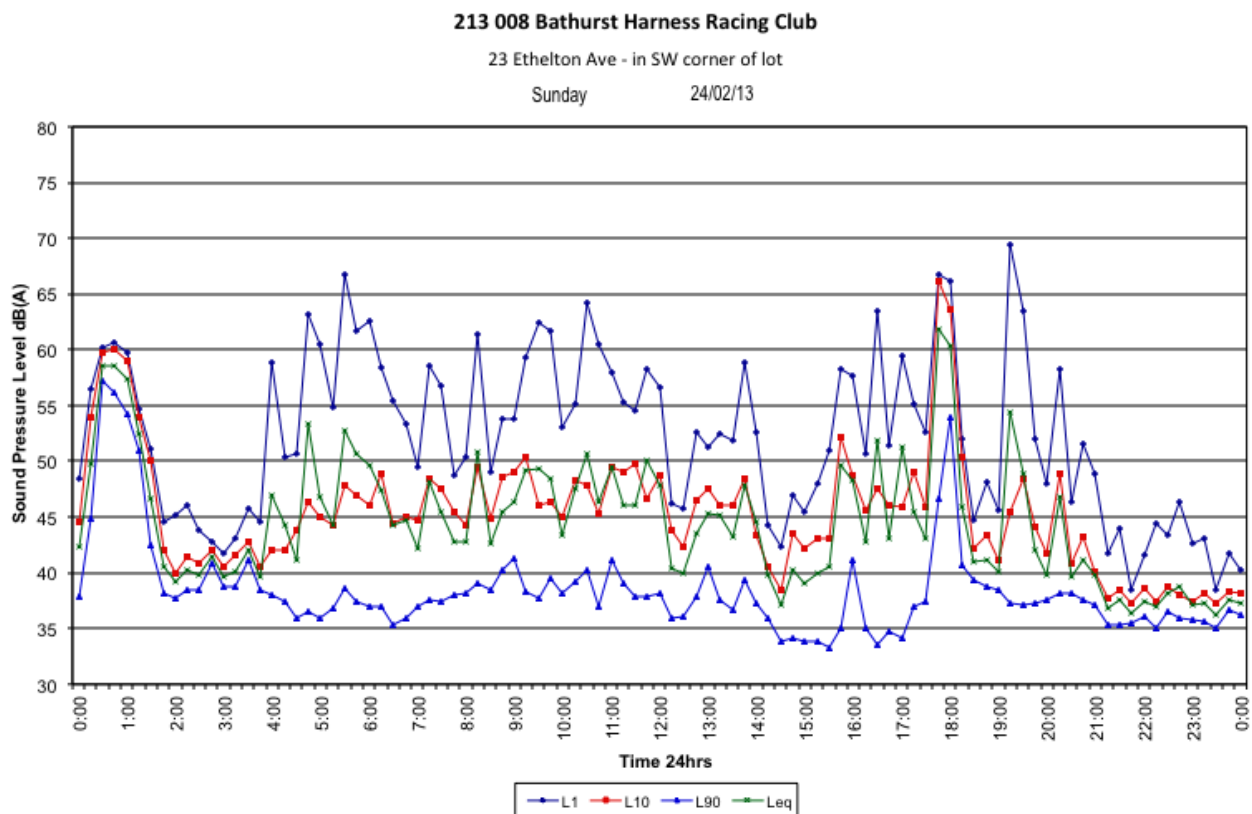


213 008 Bathurst Harness Racing Club

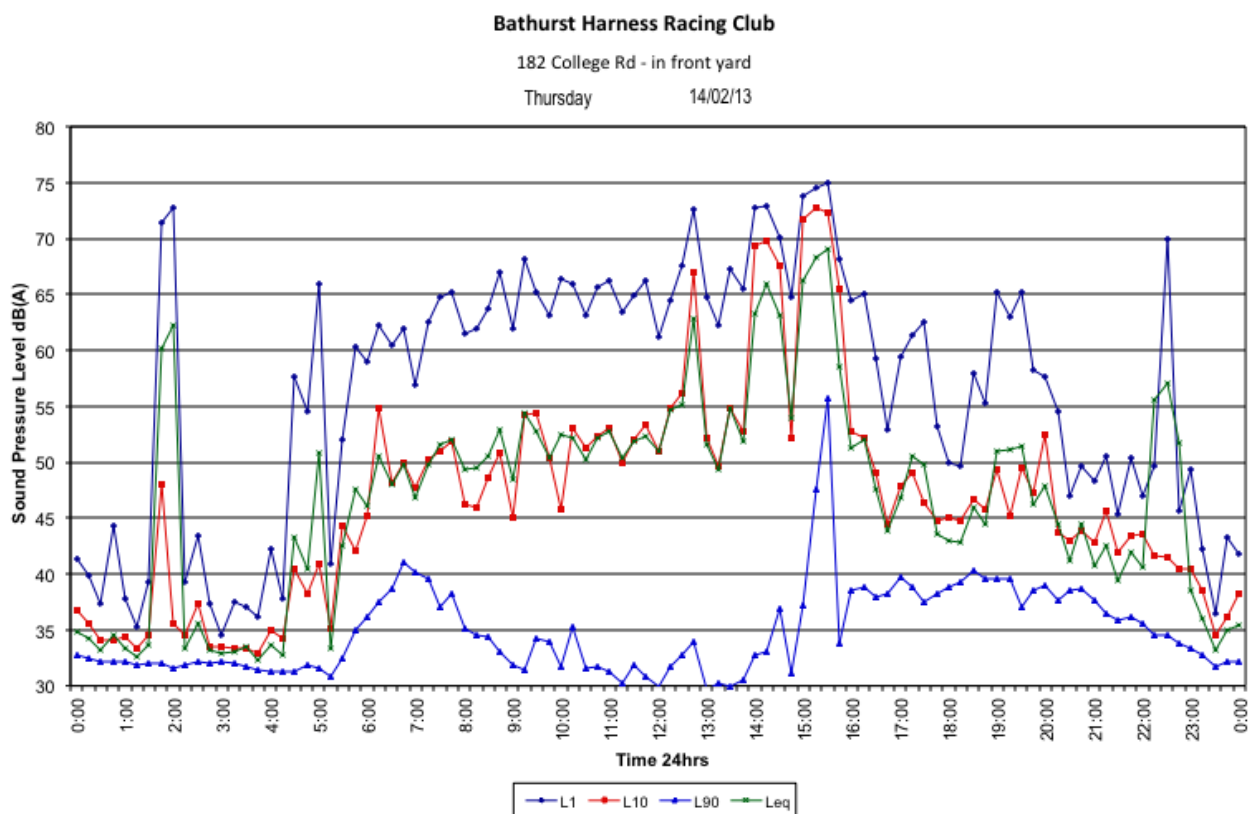
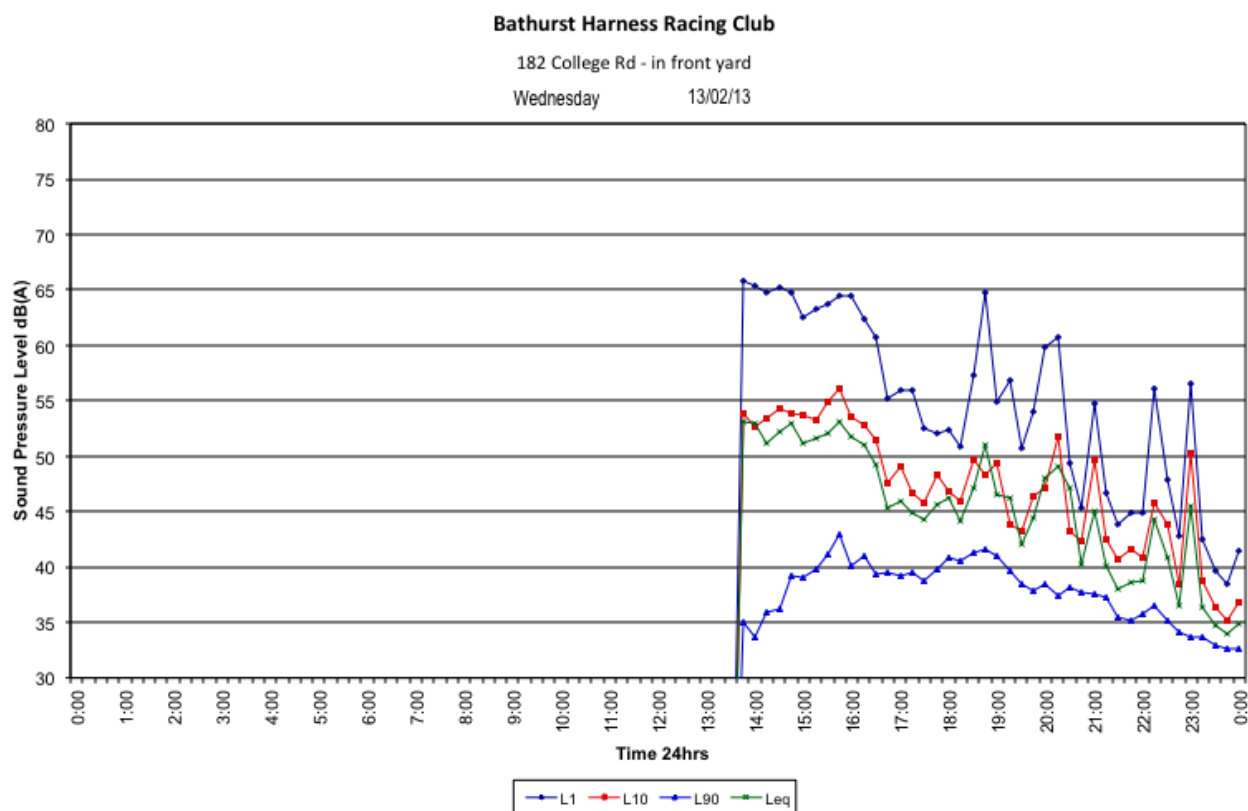
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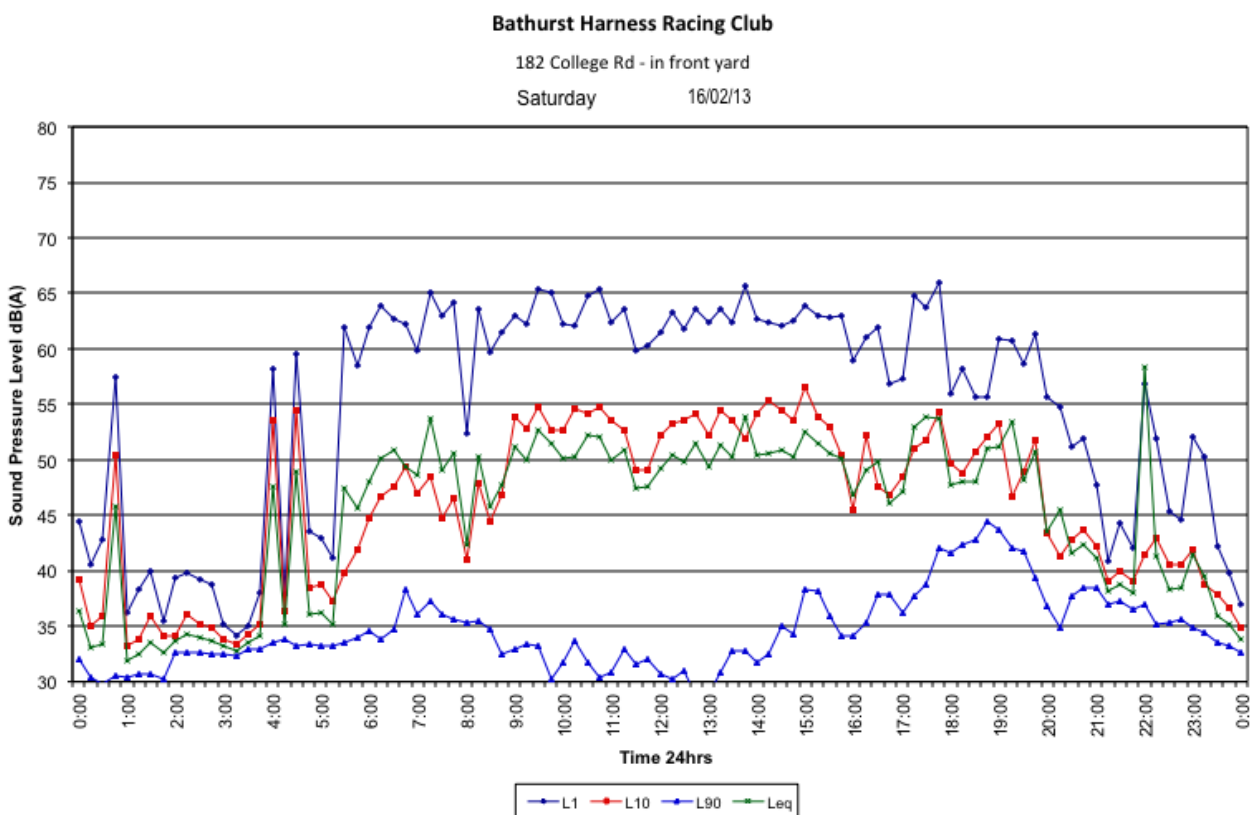
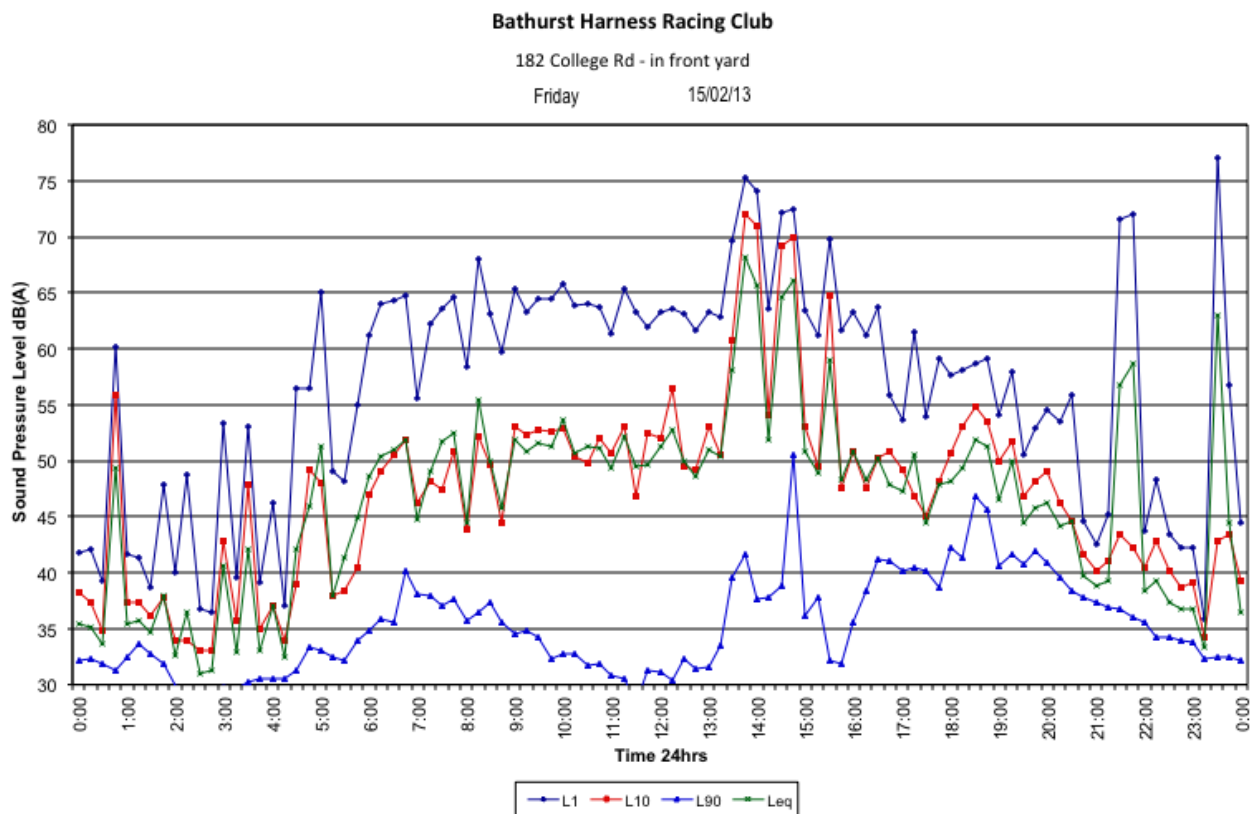
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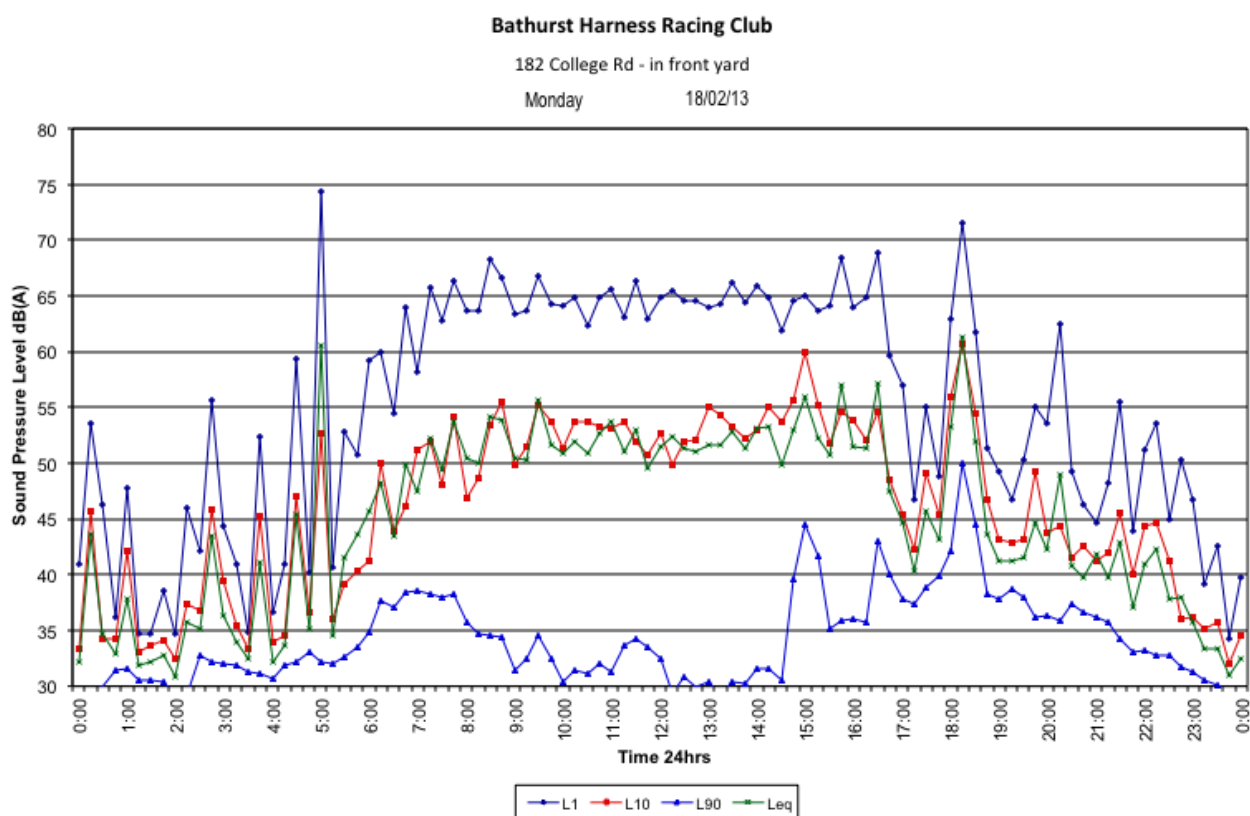
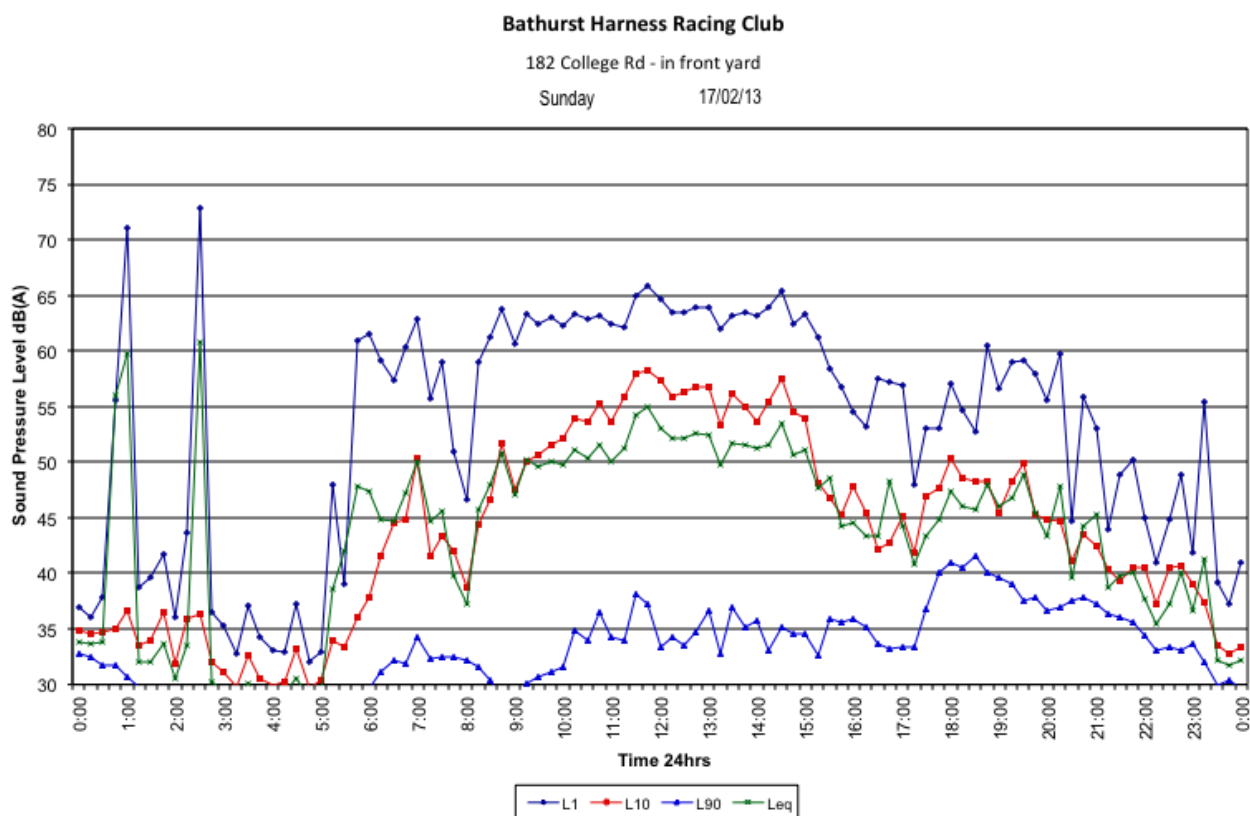


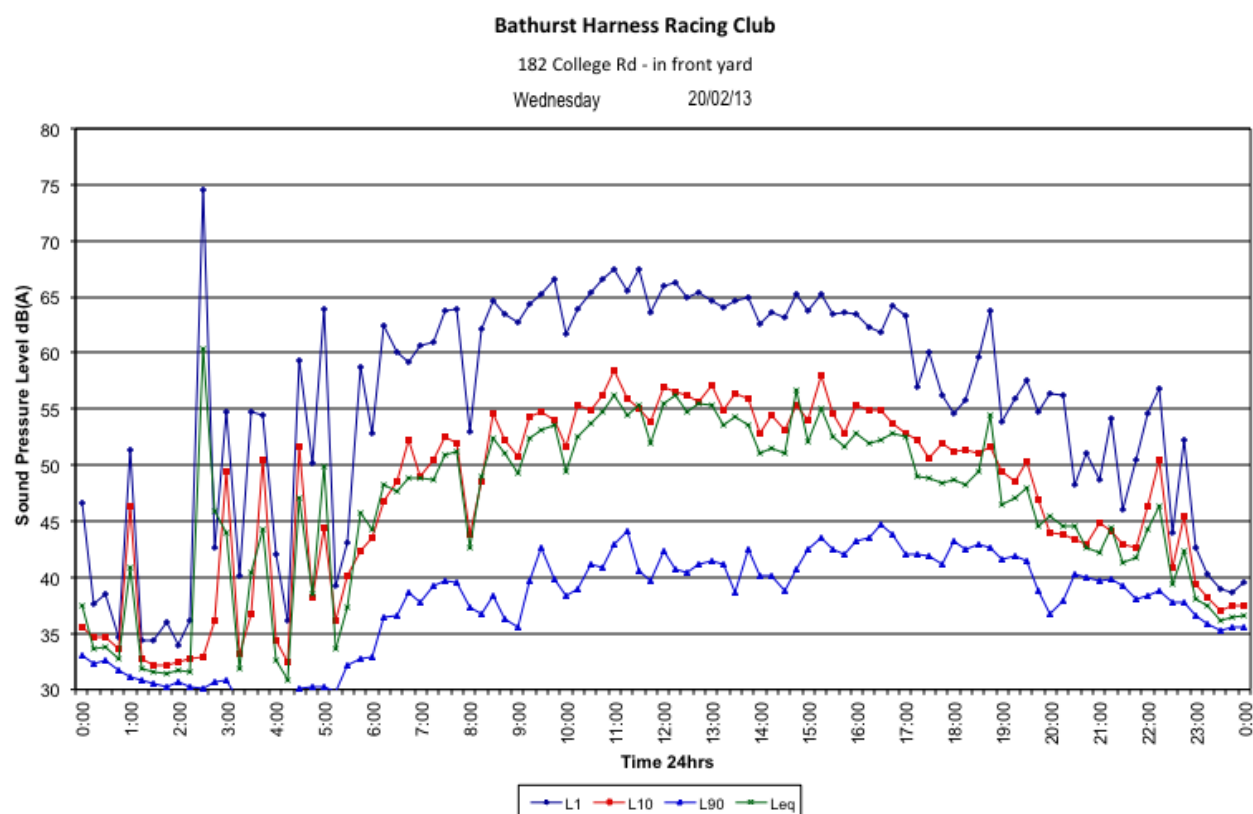
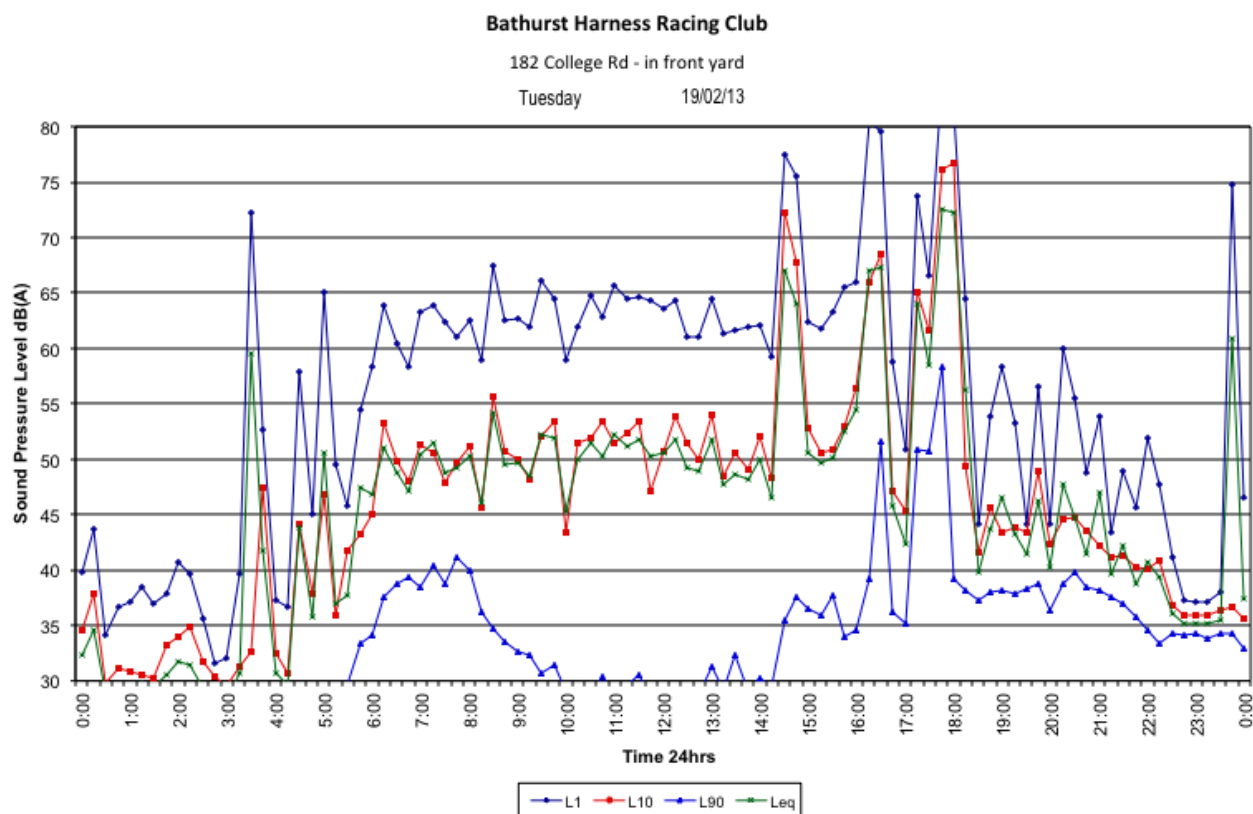


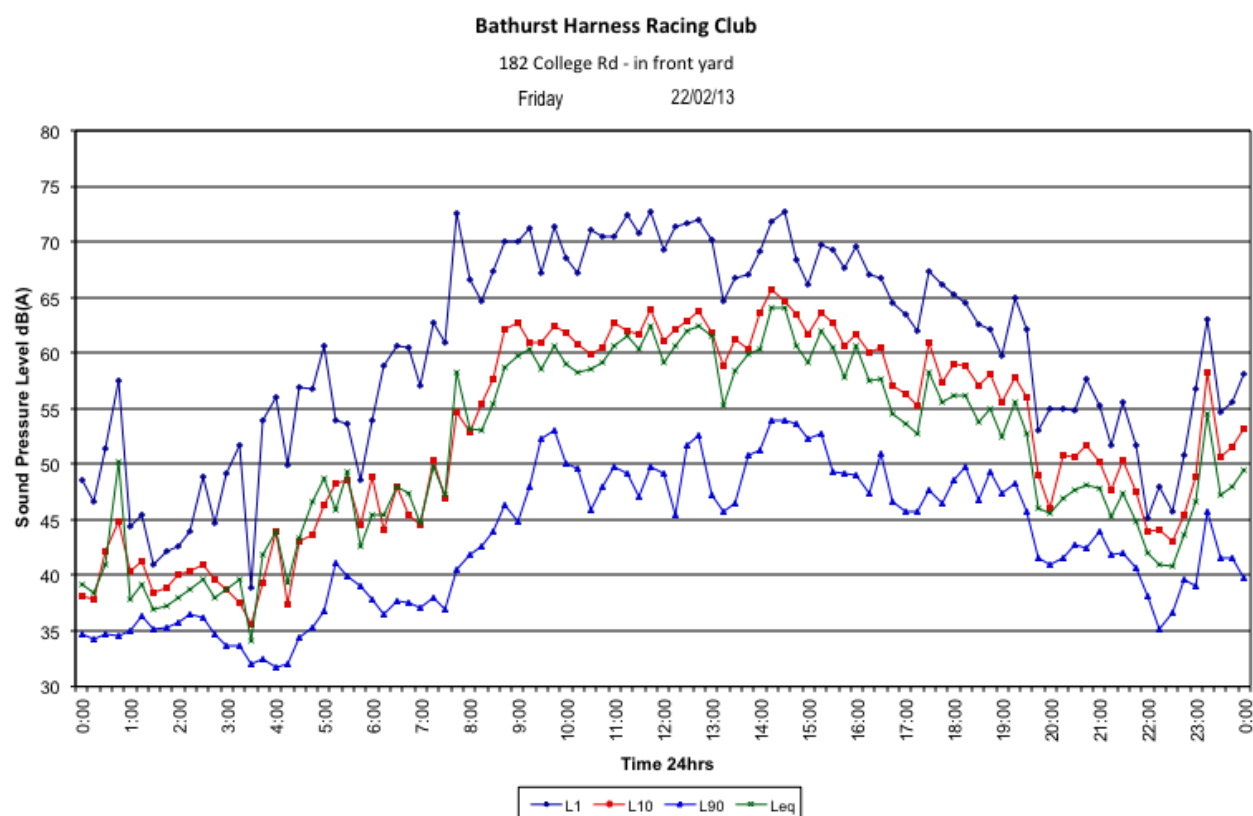
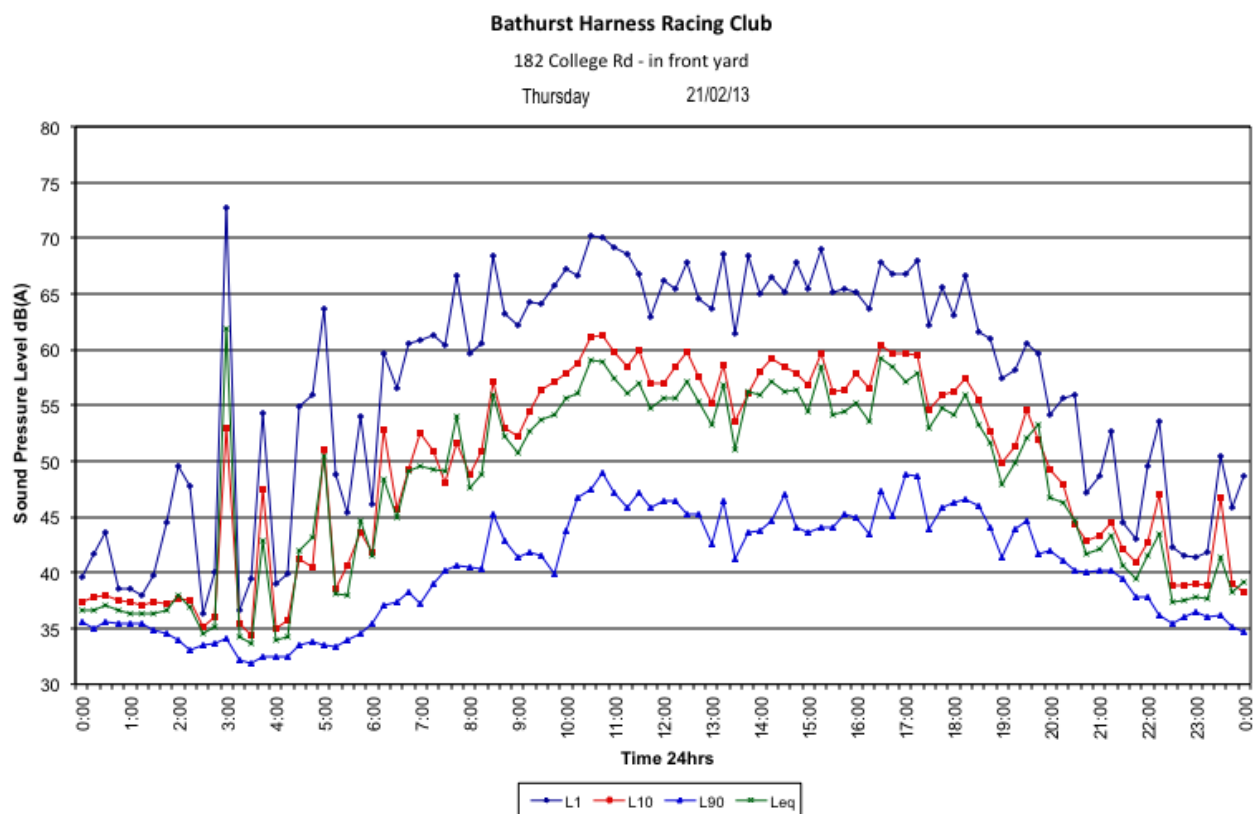
8 ATTACHMENT B: PKA NOISE LOGGING RESULTS - 182 COLLEGE ROAD

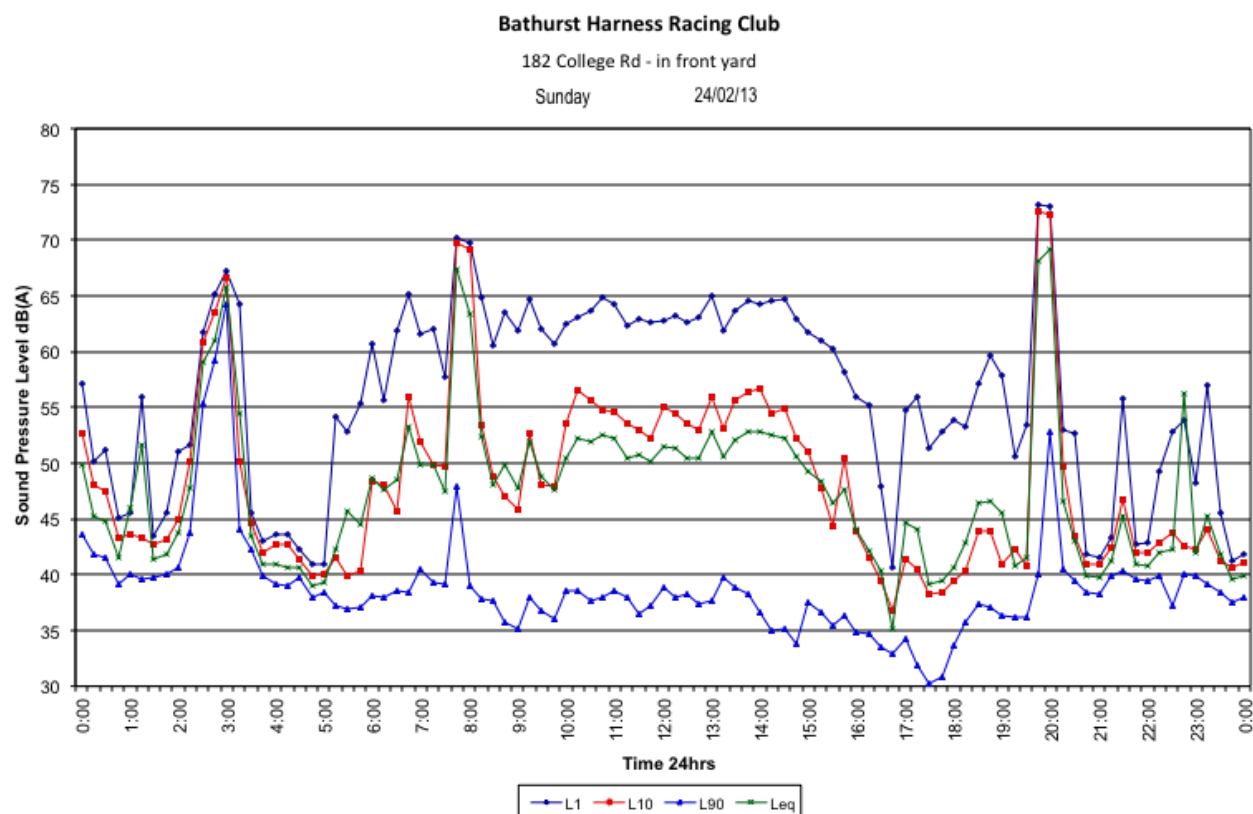
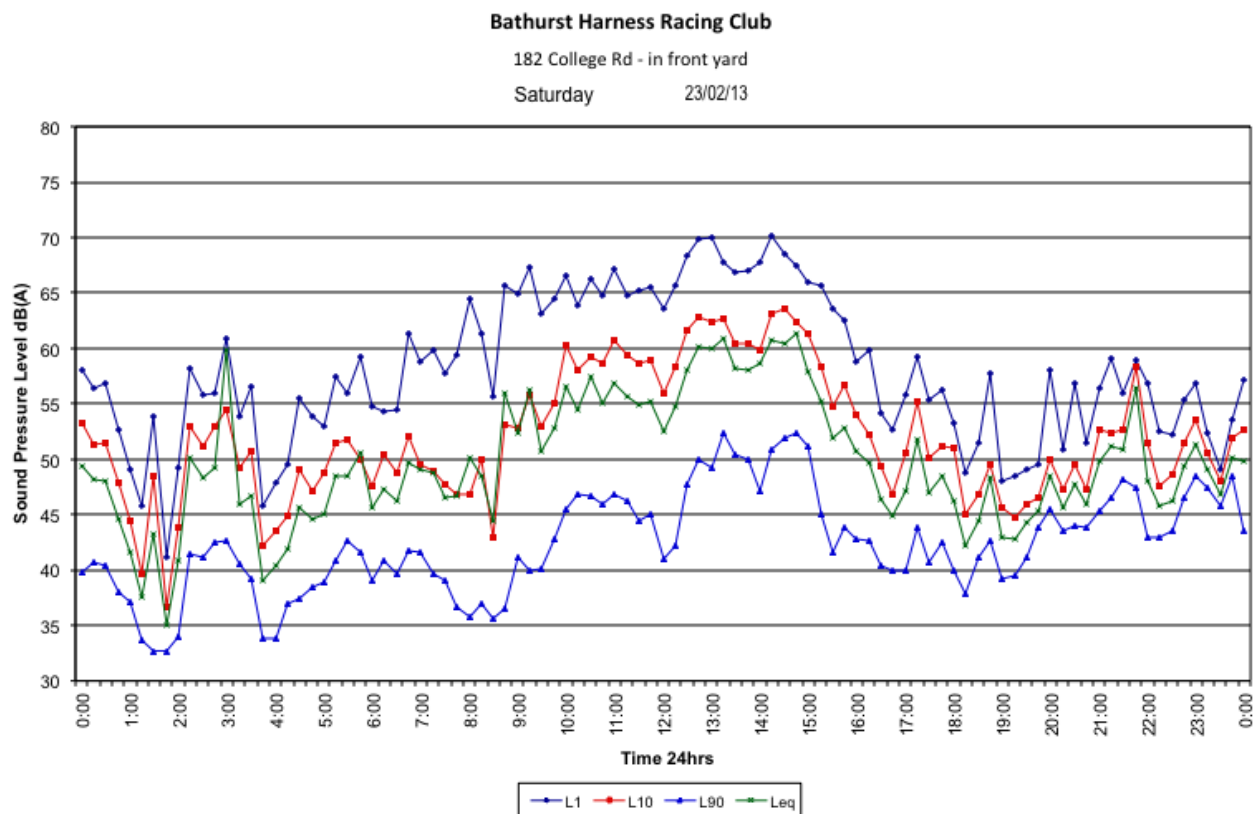


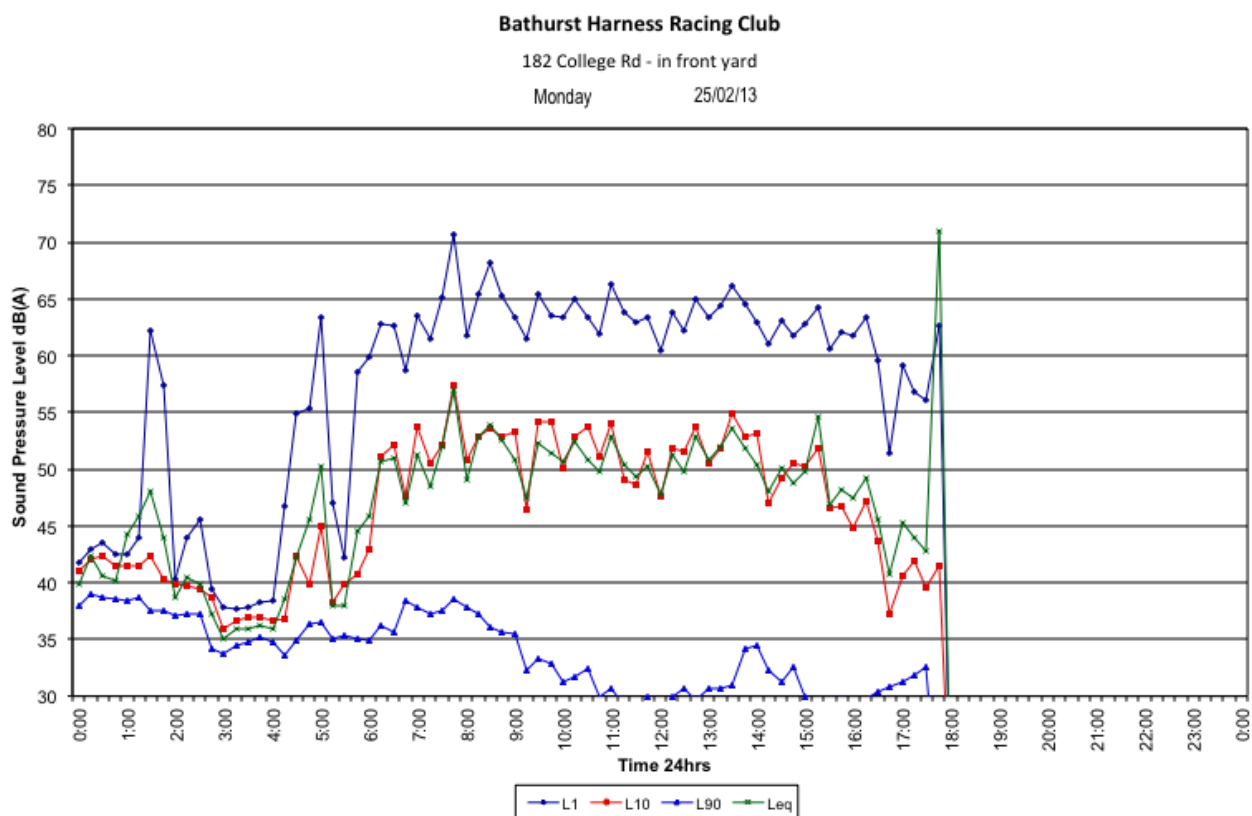




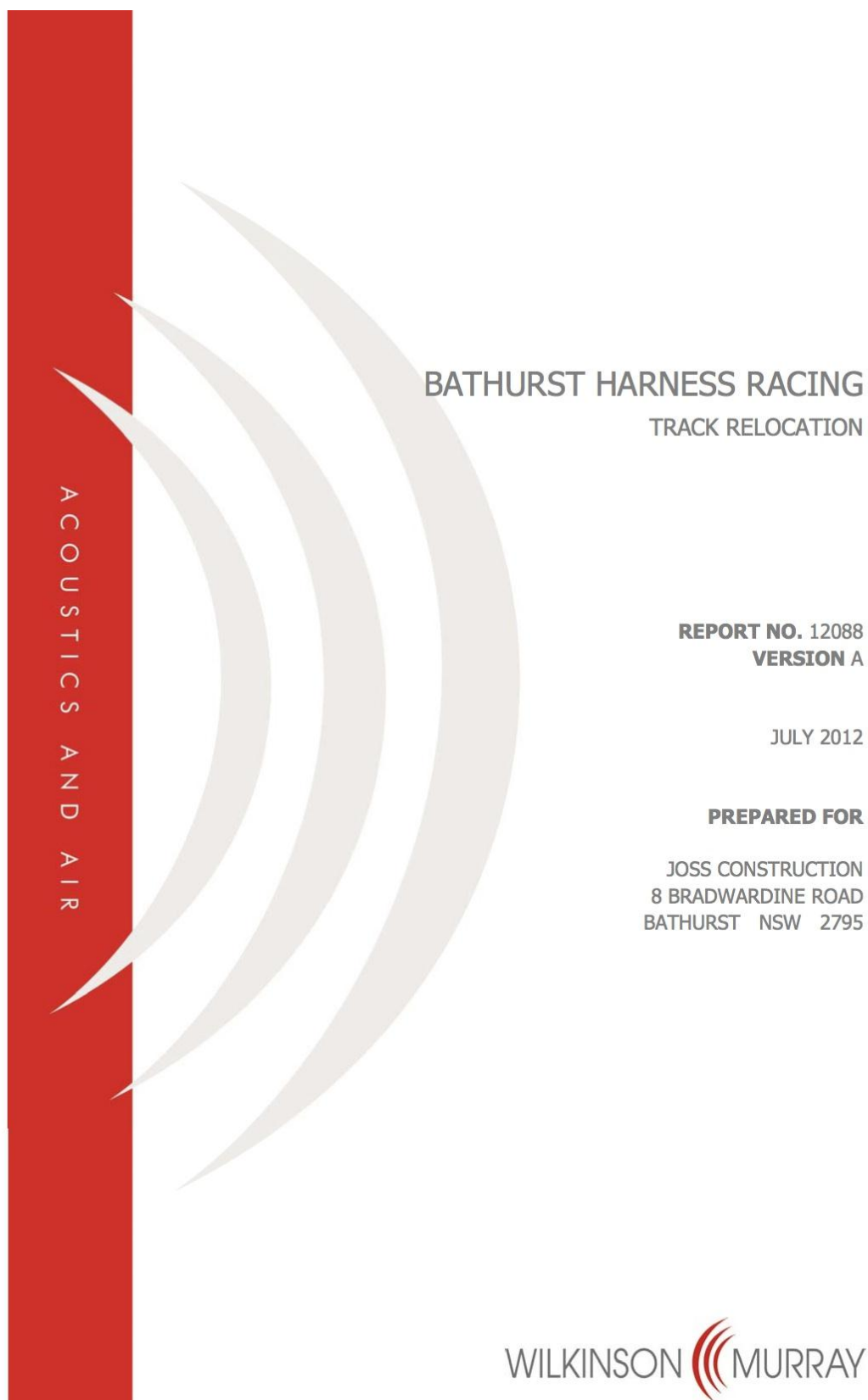








9 ATTACHMENT C: WILKINSON MURRAY REPORT



Bathurst Harness Racing
Track Relocation

Report No. 12088 Version A

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Final	5 July 2012	Luke Warren	John Wassermann

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AAAC

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.



Celebrating 50 Years in 2012

Wilkinson Murray is an independent firm established 50 years ago originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. 2010 saw the introduction of our Queensland office and 2011 the introduction of our Orange office to service a growing client base in these regions. From these offices, Wilkinson Murray services the entire Asia-Pacific region.



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ACOUSTICS AND AIR

Bathurst Harness Racing
Track Relocation

Report No. 12088 Version A

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

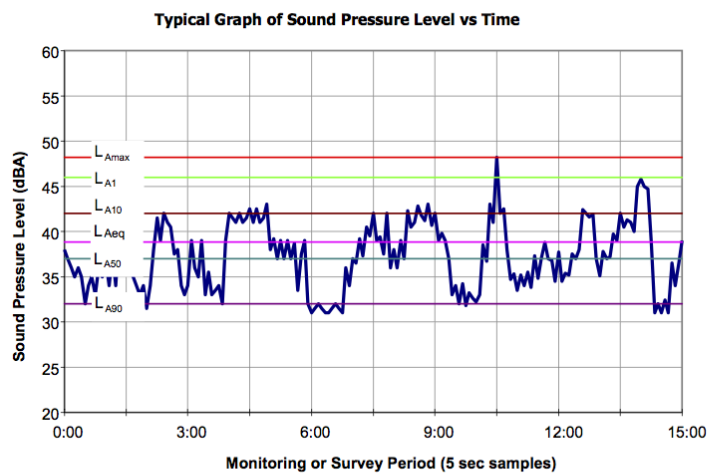
L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.



1 INTRODUCTION

This report presents an assessment of the potential noise impact associated with the proposed relocation and subsequent construction of a new harness racing track on land bordered by Ethelton Avenue and College Road in Bathurst, NSW. The harness racing track currently operates at Bathurst Showground. The new facility will operate at intermittent intervals between the hours of 7.00am and 10.00pm, any day of the week. Figure 1-1 shows the proposed site and surrounding location.

This assessment considers the following issues:

- Operational Noise
 - Noise generated by the Horse racing;
 - Noise emitted from the PA system during race meets; and
 - Noise generated by road traffic entering, exiting and moving around the complex.

Figure 1-1 Bathurst Harness Club Racing Site and Surrounding Residences



This acoustic assessment consists of the following:

- Measurement of existing noise levels at the existing nearest residential receiver of the proposed site;
- Determination of site specific criteria;
- Measurement of noise levels typical of a race meeting at the existing Bathurst Harness racing track;
- Noise modelling of the proposed new facility, to determine the potential impacts on adjacent noise sensitive receivers;
- Assessment of potential noise emissions against the established criteria; and
- Recommendations for noise control measures where necessary.

2 DEVELOPMENT DESCRIPTION

The proposed site for the new Bathurst Harness Racing Club trotting track is bound by College Road to the west and Ethelton Avenue to the north-east, with the train line to the east. Nearby noise sensitive receivers include the following:

- North: 23 Ethelton Avenue located to the north, north-east of the site, the closest of all the receivers;
- East: 226 Gormans Hill Road is the closest residential receiver to the east of the site;
- South: 233 College Road to the south-west and slightly shielded from the sight by the adjacent ridge line; and
- West: 146, 170, 182 College Road all residential receivers.

Figure 2-1 shows the proposed location of the trotting track and the major buildings associated with it. Nearby residential receivers are highlighted in yellow.

Figure 2-1 Proposed Layout showing Surrounding Residential Receivers



3 EXISTING AMBIENT NOISE LEVELS

Unattended noise monitoring was conducted between 12 and 18 March 2012. The noise logger was located on the western boundary of the property at 23 Ethelton Avenue, the nearest potentially affected residential receiver.

The noise monitoring equipment used for the noise measurements consisted of an ARL EL215 Noise Logger set to A-weighted, fast response, continuously monitoring each 15-minute period. This equipment is capable of monitoring and storing noise various level descriptors for later detailed analysis.

From the background noise levels (L_{A90}) the Rating Background Levels (RBL's) were determined using methodology as recommended by the *INP*. OEH considers the RBLs to represent the background noise level. The equipment calibration was checked before and after the survey and no significant drift was noted.

Table 3-1 summarises the results, for the measured daytime, evening and night time noise levels. Detailed charts are available on request.

Table 3-1 Ambient Noise Levels

Time Period ¹	Noise Levels (dBA)	
	L_{Aeq}	RBL
Day	49	38
Evening	52	45
Night	48	38

Note: (1) Daytime 7.00am–6.00am; Evening 6.00pm–10.00pm; Night 10.00pm–7.00am

The two descriptors are defined below:

- **$L_{AeqPeriod}$** – The overall L_{Aeq} noise level measured over the assessment period; and
- **RBL** – Rating Background Level (L_{A90}) is a measure of typical background noise levels which are used in determining noise criteria.

4 OPERATIONAL NOISE CRITERIA

This section of the report discusses noise criteria for the assessment of operational noise which includes:

- Public address system;
- Harness racing activities; and
- Movement of vehicles into, out of, and within the complex.

To assist Council in assessing developments the Environment Protection Authority (EPA) has prepared the *Noise Guide for Local Government (NGLG)*. The *NGLG* suggests that council's develop an intrusiveness criterion that limits the permissible level of noise from commercial or industrial premises to no more than the background noise plus 5dBA when measured over a 15-minute period ($L_{Aeq,15min}$).

The time periods for which intrusive criteria are applied are daytime (7.00am-6.00pm), evening (6.00pm-10.00pm) and night time (10.00pm-7.00am).

The background level is the Rating Background Noise Level (RBL) which is determined from measurement of L_{A90} noise levels, in the absence of noise from the source. Table 4-1 shows the intrusive noise criteria for the project.

Table 4-1 Relevant Intrusiveness Noise Criteria

Time Period	RBL	Intrusiveness Criterion
		$L_{Aeq,15min}$
Day	38	43
Evening	45	50
Night	38	43

Note: (1) Daytime 7.00am-6.00am; Evening 6.00pm-10.00pm; Night 10.00pm-7.00am

For consistency, a blanket criterion of 43dBA has been applied for all periods.

5 NOISE MODELLING

Continuous and semi-continuous noise associated with the Bathurst Harness Racing Club is generated by the public address system and the racing itself. The facility will operate at intermittent intervals between the hours of 7.00am and 10.00pm, any day of the week.

Intermittent noise may also be generated by vehicles accessing the facility; however, this is not considered to be an issue.

Noise sources that contribute significantly to the 15-minute and longer term L_{Aeq} noise levels are presented in Table 5-1. These have been adjusted to 15-minute L_{Aeq} levels.

Table 5-1 Measured Source Noise levels

Item	Sound Pressure Level at 25m, L_{Aeq}	Sound Pressure Level at 30m, L_{Aeq}
	(dBA)	(dBA)
Public Address System	52	-
Harness Racing	-	58

Site related noise emissions were modeled using CadnaA noise prediction software. A representative 3-dimensional model of the site and adjacent residential receivers was constructed.

Factors that are addressed in the modeling are:

- Site specific sound level emissions and locations;
- Screening effects from buildings;
- Receiver locations;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

6 NOISE PREDICTIONS

Noise modelling was completed for a worst-case scenario, which was considered to be a race event with continuous announcements and commentating over the public address system. Relative noise levels were predicted at the following potentially worst-affected residential receivers listed below in order of proximity to the site:

- 23 Ethelton Avenue;
- 146 College Road;
- 170 College Road;
- 182 College Road;
- 233 College Road; and
- 226 Gormans Hill Road.

Table 6-1 presents the predicted levels for each of the residential receivers.

Table 6-1 Night Time Predicted Noise Levels

Receiver Location	Predicted Noise Level (dBA)	Criteria	Comply (Y/N)
23 Ethelton Avenue	47	43	N
146 College Road	31	43	Y
170 College Road	34	43	Y
182 College Road	33	43	Y
233 College Road	34	43	Y
226 Gormans Hill Road	31	43	Y

During all time periods, the noise levels meet the criteria at all but one receiver; 23 Ethelton Avenue. The criterion at this receiver is exceeded by 4dB. As a result, some mitigation measures will be required to control noise emissions associated with the new facility at this residence. Potential options are provided in the Section 7.

7 RECOMMENDATIONS

It is recommended that a barrier be erected in the form of a dirt bund or noise wall to attenuate the noise to within the noise criterion. The minimum height of the barrier should be between 3.5m and 4m. Figure 7-1 and Figure 7-2 outline two barrier location options which are depicted using a thick black line to the south and west of the residential property at 23 Ethelton Avenue.

Figure 7-1 Option 1 – Recommended Location of Noise Barrier



Figure 7-2 Option 2 – Recommended Location of Noise Barrier



It is also suggested that a directional public address system be installed where possible, and that the loud speakers be pointed away from the residential receiver at 23 Ethelton Avenue.

8 CONCLUSION

Wilkinson Murray has conducted a noise assessment of the proposed new Bathurst Harness Racing Club facility bordered by Ethelton Avenue and College Road in Bathurst, NSW.

Operational noise impacts associated with the proposal are predicted to be within the intrusiveness criteria recommended by the NSW *Industrial Noise Policy* at all but one receiver.

Mitigation options have been provided. Ensuring all recommendations are undertaken, operation of the facility should comply with the recommended noise criteria for day, evening and night time.



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